* * * MILITARY USE ONLY * * *

Kawasaki

Teryx 750 FI 4×4

Teryx 750 FI 4×4 LE

Teryx 750 FI 4×4 Sport

Recreation Utility Vehicle Service Manual

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Quick Reference Guide

General Information	1
Periodic Maintenance	2
Fuel System (DFI)	3
Cooling System	4
Engine Top End	5
Converter System	6
Engine Lubrication System	7
Engine Removal/Installation	8
Crankshaft/Transmission	9
Wheels/Tires	10
Final Drive	11
Brakes	12
Suspension	13
Steering	14
Frame	15
Electrical System	16
Appendix	17

This quick reference guide will assist you in locating a desired topic or procedure.

- Bend the pages back to match the black tab of the desired chapter number with the black tab on the edge at each table of contents page.
- Refer to the sectional table of contents for the exact pages to locate the specific topic required.

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Kawasaki

Teryx 750 FI 4×4
Teryx 750 FI 4×4 LE
Teryx 750 FI 4×4 Sport

Recreation Utility Vehicle Service Manual

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The right is reserved to make changes at any time without prior notice and without incurring an obligation to make such changes to products manufactured previously. See your dealer for the latest information on product improvements incorporated after this publication.

All information contained in this publication is based on the latest product information available at the time of publication. Illustrations and photographs in this publication are intended for reference use only and may not depict actual model component parts.

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LIST OF ABBREVIATIONS

A	ampere(s)	lb	pounds(s)
ABDC	after bottom dead center	m	meter(s)
AC	alternating current	min	minute(s)
ATDC	after top dead center	N	newton(s)
BBDC	before bottom dead center	Pa	pascal(s)
BDC	bottom dead center	PS	horsepower
BTDC	before top dead center	psi	pound(s) per square inch
°C	degree(s) Celsius	r	revolution
DC	direct current	rpm	revolution(s) per minute
F	farad(s)	TDC	top dead center
°F	degree(s) Fahrenheit	TIR	total indicator reading
ft	foot, feet	V	volt(s)
g	gram(s)	W	watt(s)
h	hour(s)	Ω	ohm(s)
L	liter(s)		

COUNTRY AND AREA CODES

CA	Canada	US	United States

Teryx 750 FI 4×4:	KRF750N/T Models
Teryx 750 FI 4×4 LE:	KRF750P/R Models
Teryx 750 FI 4×4 Sport:	KRF750S Model

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EMISSION CONTROL INFORMATION

To protect the environment in which we all live, Kawasaki has incorporated crankcase emission (1), exhaust emission (2), and evaporative emission (3) control systems in compliance with applicable regulations of the United States Environmental Protection Agency.

1. Crankcase Emission Control System
A sealed-type crankcase emission control system is used to eliminate blow-by gases. The blow-by gases are led to the breather chamber through the crankcase. Then, it is led to the air cleaner. Oil is separated from the gases while passing through the inside of the breather chamber from the crankcase, and then returned back to the bottom of crankcase.

2. Exhaust Emission Control System
The exhaust emission control system applied to this engine family is engine modifications that consist of a fuel injection and ignition system having optimum ignition timing characteristics.
The fuel injection system has been calibrated to provide lean air/fuel mixture characteristics and optimum fuel economy with a suitable air cleaner and exhaust system.
A maintenance free ignition system provides the most favorable ignition timing and helps maintain a thorough combustion process within the engine which contributes to a reduction of exhaust pollutants entering the atmosphere.

3. Evaporative Emission Control System
The evaporative emission control system for this vehicle consists of low permeation fuel hoses and a fuel tank.

The Clean Air Act, which is the Federal law covering motor vehicle pollution, contains what is commonly referred to as the Act's "tampering provisions."

"Sec. 203(a) The following acts and the causing thereof are prohibited...

(3)(A) for any person to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title prior to its sale and delivery to the ultimate purchaser, or for any manufacturer or dealer knowingly to remove or render inoperative any such device or element of design after such sale and delivery to the ultimate purchaser.

(3)(B) for any person engaged in the business of repairing, servicing, selling, leasing, or trading motor vehicles or motor vehicle engines, or who operates a fleet of motor vehicles knowingly to remove or render inoperative any device or element of design installed on or in a motor vehicle or motor vehicle engine in compliance with regulations under this title following its sale and delivery to the ultimate purchaser..."

NOTE

○*The phrase "remove or render inoperative any device or element of design" has been generally interpreted as follows:*

1. *Tampering does not include the temporary removal or rendering inoperative of devices or elements of design in order to perform maintenance.*
2. *Tampering could include:*
   a. *Maladjustment of vehicle components such that the emission standards are exceeded.*
   b. *Use of replacement parts or accessories which adversely affect the performance or durability of the vehicle.*
   c. *Addition of components or accessories that result in the vehicle exceeding the standards.*
   d. *Permanently removing, disconnecting, or rendering inoperative any component or element of design of the emission control systems.*

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WE RECOMMEND THAT ALL DEALERS OBSERVE THESE PROVISIONS OF FEDERAL LAW, THE VIOLATION OF WHICH IS PUNISHABLE BY CIVIL PENALTIES NOT EXCEEDING $10,000 PER VIOLATION.

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PLEASE DO NOT TAMPER WITH NOISE CONTROL SYSTEM (US MODEL only)

To minimize the noise emissions from this product, Kawasaki has equipped it with effective inlet and exhaust silencing systems. They are designed to give optimum performance while maintaining a low noise level. Please do not remove these systems, or alter them in any way which results in an increase in noise level.

TAMPERING WITH EMISSION CONTROL SYSTEM PROHIBITED:

Federal regulations and California State law prohibit the following acts or the causing thereof: (1) the removal or rendering inoperative by any person other than for purposes of maintenance, repair, or replacement, of any device or element of design incorporated into any new vehicle for the purposes of emission control prior to its sale or delivery to the ultimate purchaser or while it is in use, or (2) the use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

Do not tamper with the original emission related parts:

- Throttle body and internal parts
- Spark plugs
- Alternator or electronic battery ignition system
- Fuel filter/Fuel injector/Fuel pump
- Air cleaner element
- ECU (Electronic Control Unit)

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Foreword

This manual is designed primarily for use by trained mechanics in a properly equipped shop. However, it contains enough detail and basic information to make it useful to the owner who desires to perform his own basic maintenance and repair work. A basic knowledge of mechanics, the proper use of tools, and workshop procedures must be understood in order to carry out maintenance and repair satisfactorily. Whenever the owner has insufficient experience or doubts his ability to do the work, all adjustments, maintenance, and repair should be carried out only by qualified mechanics.

In order to perform the work efficiently and to avoid costly mistakes, read the text, thoroughly familiarize yourself with the procedures before starting work, and then do the work carefully in a clean area. Whenever special tools or equipment are specified, do not use makeshift tools or equipment. Precision measurements can only be made if the proper instruments are used, and the use of substitute tools may adversely affect safe operation.

For the duration of the warranty period, we recommend that all repairs and scheduled maintenance be performed in accordance with this service manual. Any owner maintenance or repair procedure not performed in accordance with this manual may void the warranty.

To get the longest life out of your vehicle:

- Follow the Periodic Maintenance Chart in the Service Manual.
- Be alert for problems and non-scheduled maintenance.
- Use proper tools and genuine Kawasaki Vehicle parts. Special tools, gauges, and testers that are necessary when servicing Kawasaki vehicles are introduced by the Service Manual. Genuine parts provided as spare parts are listed in the Parts Catalog.
- Follow the procedures in this manual carefully. Don't take shortcuts.
- Remember to keep complete records of maintenance and repair with dates and any new parts installed.

How to Use This Manual

In this manual, the product is divided into its major systems and these systems make up the manual's chapters. The Quick Reference Guide shows you all of the product's system and assists in locating their chapters. Each chapter in turn has its own comprehensive Table of Contents.

For example, if you want engine oil information, use the Quick Reference Guide to locate the Engine lubrication System chapter. Then, use the Table of Contents on the first page of the chapter to find the Engine Oil section.

Whenever you see symbols, heed their instructions! Always follow safe operating and maintenance practices.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

This manual contains four more symbols which will help you distinguish different types of information.

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NOTE

○ *This note symbol indicates points of particular interest for more efficient and convenient operation.*

● Indicates a procedural step or work to be done.

○ Indicates a procedural sub-step or how to do the work of the procedural step it follows. It also precedes the text of a NOTE.

★ Indicates a conditional step or what action to take based on the results of the test or inspection in the procedural step or sub-step it follows.

In most chapters an exploded view illustration of the system components follows the Table of Contents. In these illustrations you will find the instructions indicating which parts require specified tightening torque, oil, grease or a locking agent during assembly.

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General Information

Table of Contents

1

Before Servicing 1-2
Model Identification 1-7
General Specifications 1-11
Unit Conversion Table 1-15

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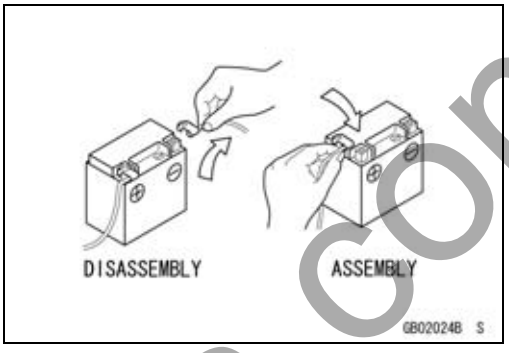
Before Servicing

Before starting to perform an inspection service or carry out a disassembly and reassembly operation on a vehicle, read the precautions given below. To facilitate actual operations, notes, illustrations, photographs, cautions, and detailed descriptions have been included in each chapter wherever necessary. This section explains the items that require particular attention during the removal and reinstallation or disassembly and reassembly of general parts.

Especially note the following:

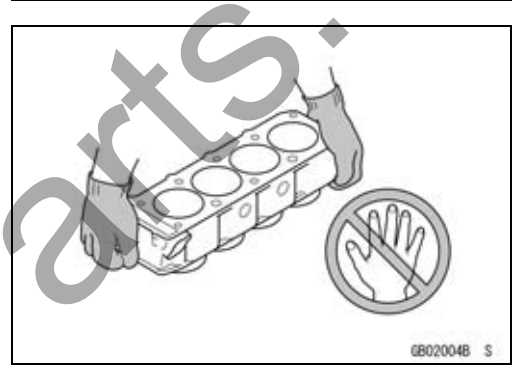
Battery Ground

Before completing any service on the vehicle, disconnect the battery wires from the battery to prevent the engine from accidentally turning over. Disconnect the ground wire (–) first and then the positive (+). When completed with the service, first connect the positive (+) wire to the positive (+) terminal of the battery then the negative (–) wire to the negative terminal.



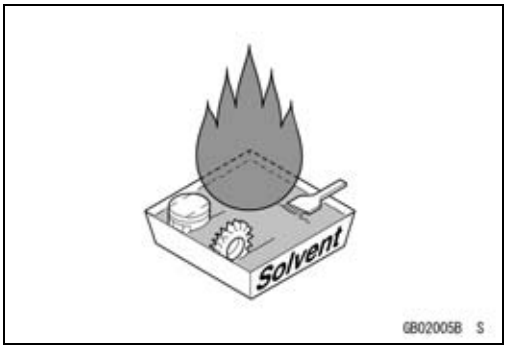
Edges of Parts

Lift large or heavy parts wearing gloves to prevent injury from possible sharp edges on the parts.



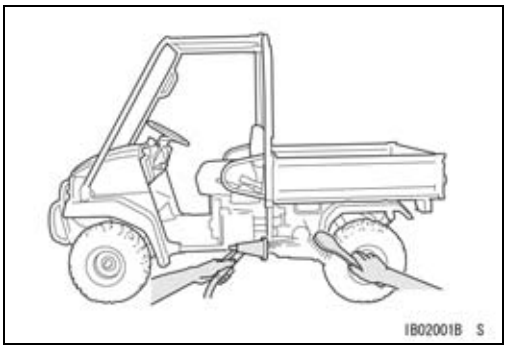
Solvent

Use a high-flush point solvent when cleaning parts. High -flush point solvent should be used according to directions of the solvent manufacturer.



Cleaning vehicle before disassembly

Clean the vehicle thoroughly before disassembly. Dirt or other foreign materials entering into sealed areas during vehicle disassembly can cause excessive wear and decrease performance of the vehicle.



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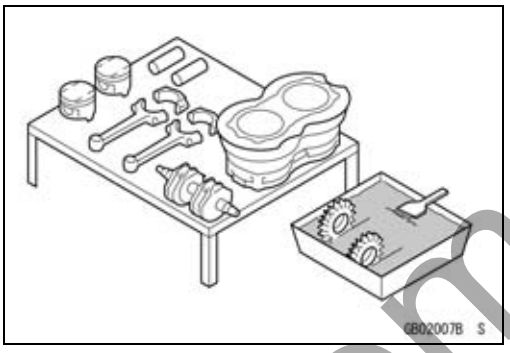
Before Servicing

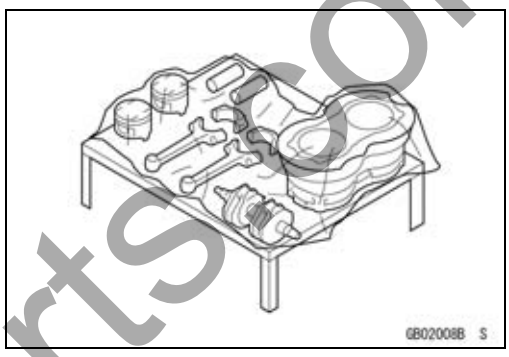
Arrangement and Cleaning of Removed Parts

Disassembled parts are easy to confuse. Arrange the parts according to the order the parts were disassembled and clean the parts in order prior to assembly.



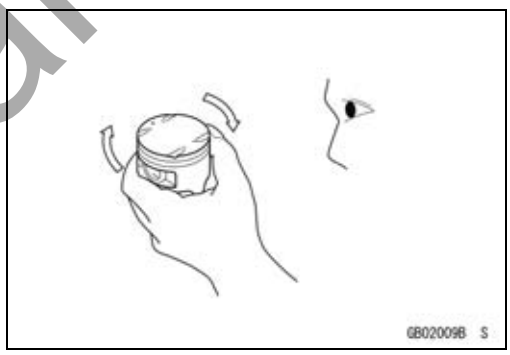
Storage of Removed Parts

After all the parts including subassembly parts have been cleaned, store the parts in a clean area. Put a clean cloth or plastic sheet over the parts to protect from any foreign materials that may collect before re-assembly.



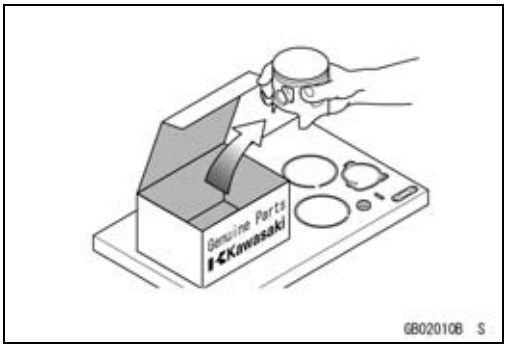
Inspection

Reuse of worn or damaged parts may lead to serious accident. Visually inspect removed parts for corrosion, discoloration, or other damage. Refer to the appropriate sections of this manual for service limits on individual parts. Replace the parts if any damage has been found or if the part is beyond its service limit.



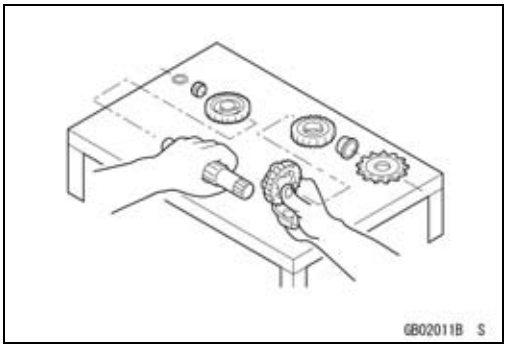
Replacement Parts

Replacement Parts must be KAWASAKI genuine or recommended by KAWASAKI. Gaskets, O-rings, Oil seals, Grease seals, circlips, cotter pins or self-locking nuts must be replaced with new ones whenever disassembled.



Assembly Order

In most cases assembly order is the reverse of disassembly, however, if assembly order is provided in this Service Manual, follow the procedures given.



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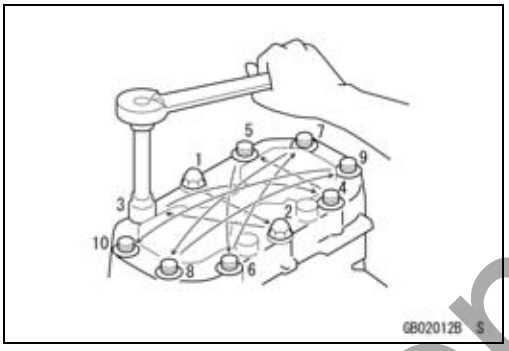
Before Servicing

Tightening Sequence

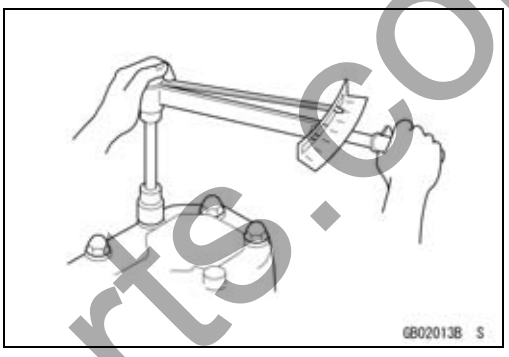
Generally, when installing a part with several bolts, nuts, or screws, start them all in their holes and tighten them to a snug fit. Then tighten them according to the specified sequence to prevent case warpage or deformation which can lead to malfunction. Conversely when loosening the bolts, nuts, or screws, first loosen all of them by about a quarter turn and then remove them. If the specified tightening sequence is not indicated, tighten the fasteners alternating diagonally.



Tightening Torque

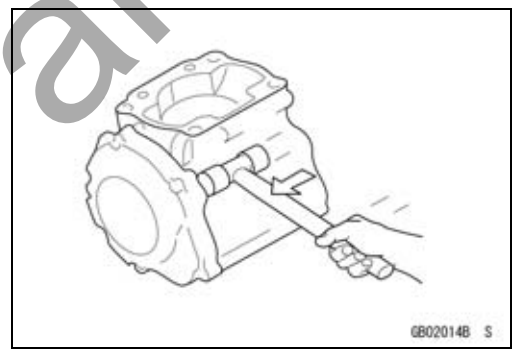
Incorrect torque applied to a bolt, nut, or screw may lead to serious damage. Tighten fasteners to the specified torque using a good quality torque wrench.

Often, the tightening sequence is followed twice initial tightening and final tightening with torque wrench.



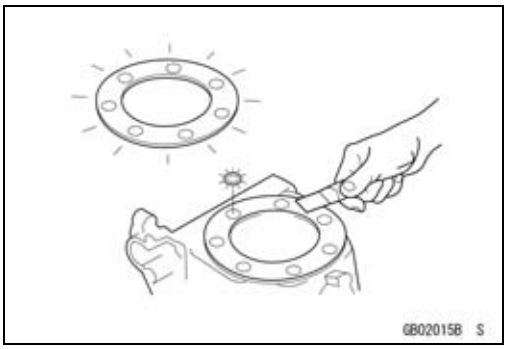
Force

Use common sense during disassembly and assembly, excessive force can cause expensive or hard to repair damage. When necessary, remove screws that have a non-permanent locking agent applied using an impact driver. Use a plastic-faced mallet whenever tapping is necessary.



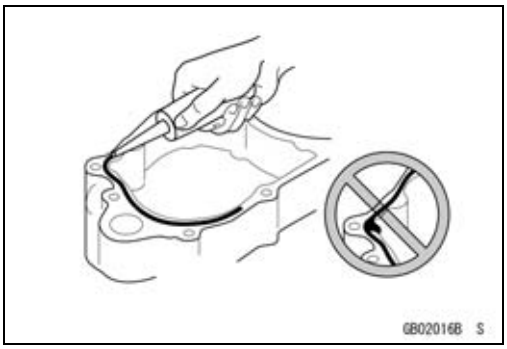
Gasket, O-ring

Hardening, shrinkage, or damage of both gaskets and O-rings after disassembly can reduce sealing performance. Remove old gaskets and clean the sealing surfaces thoroughly so that no gasket material or other material remains. Install new gaskets and replace used O-rings when re-assembling.



Liquid Gasket, Locking Agent

For applications that require Liquid Gasket or a Non-Permanent Locking Agent, clean the surfaces so that no oil residue remains before applying liquid gasket or locking agent. Do not apply them excessively. Excessive application can clog oil passages and cause serious damage.



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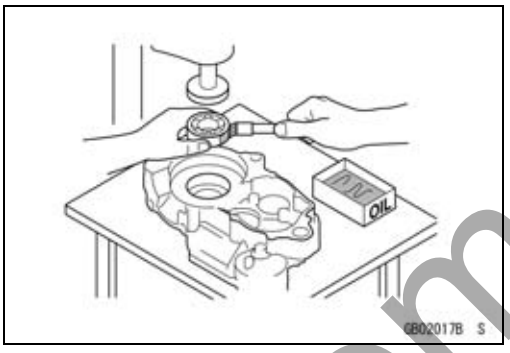
Before Servicing

Press

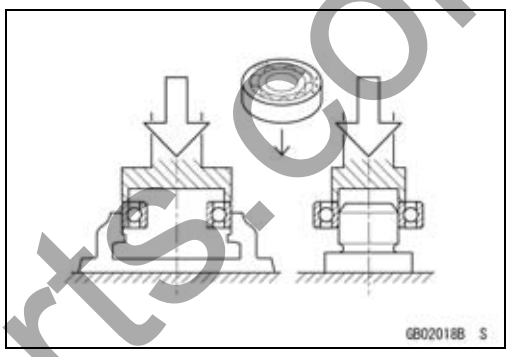
For items such as bearings or oil seals that must be pressed into place, apply small amount of oil to the contact area. Be sure to maintain proper alignment and use smooth movements when installing.



Ball Bearing and Needle Bearing

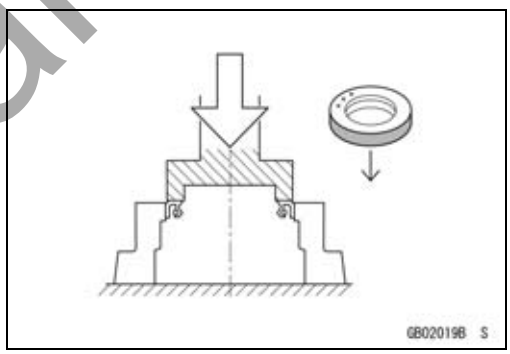
Do not remove pressed ball or needle unless removal is absolutely necessary. Replace with new ones whenever removed. Press bearings with the manufacturer and size marks facing out. Press the bearing into place by putting pressure on the correct bearing race as shown.

Pressing the incorrect race can cause pressure between the inner and outer race and result in bearing damage.

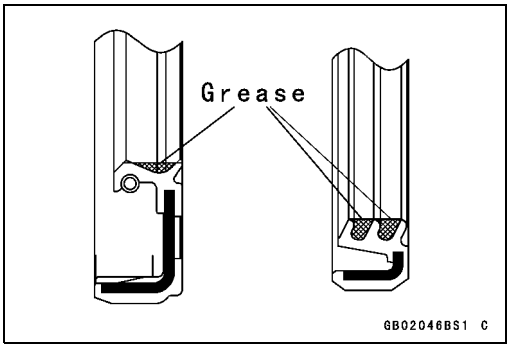


Oil Seal, Grease Seal

Do not remove pressed oil or grease seals unless removal is necessary. Replace with new ones whenever removed. Press new oil seals with manufacture and size marks facing out. Make sure the seal is aligned properly when installing.

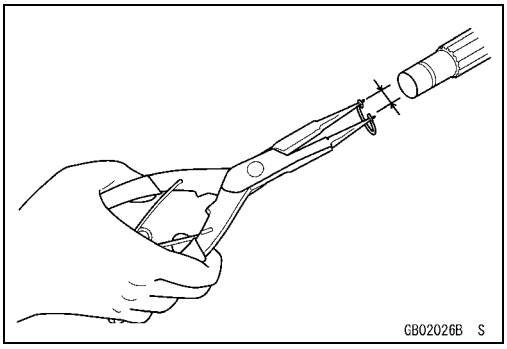


Apply specified grease to the lip of seal before installing the seal.



Circlips, Cotter Pins

Replace circlips or cotter pins that were removed with new ones. Take care not to open the clip excessively when installing to prevent deformation.



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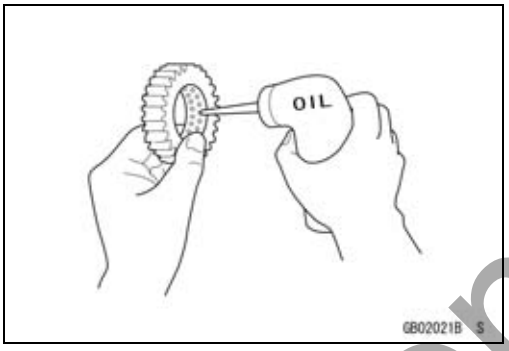
Before Servicing

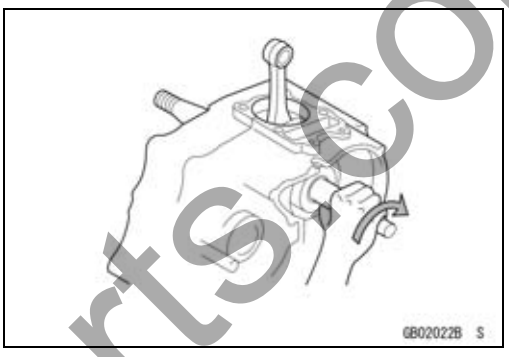
Lubrication

It is important to lubricate rotating or sliding parts during assembly to minimize wear during initial operation. Lubrication points are called out throughout this manual, apply the specific oil or grease as specified.



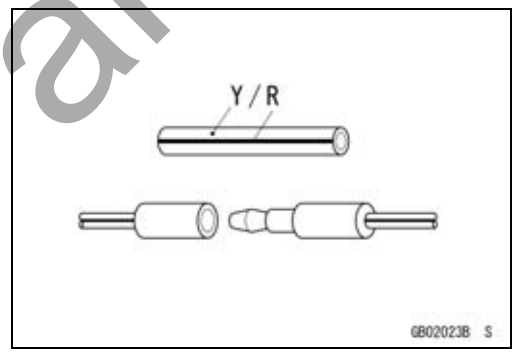
Direction of Engine Rotation

When rotating the crankshaft by hand, the free play amount of rotating direction will affect the adjustment. Rotate the crankshaft to positive direction (clockwise viewed from right side).



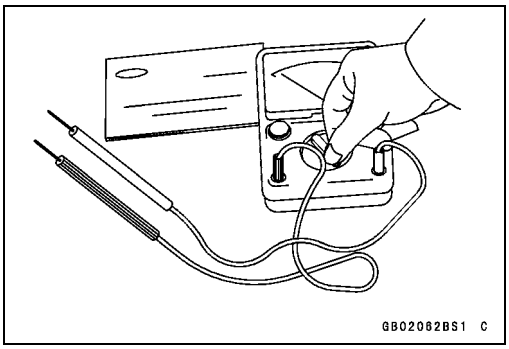
Electrical Wires

A two-color wire is identified first by the primary color and then the stripe color. Unless instructed otherwise, electrical wires must be connected to those of the same color.



Instrument

Use a meter that has enough accuracy for an accurate measurement. Read the manufacture's instructions thoroughly before using the meter. Incorrect values may lead to improper adjustments.



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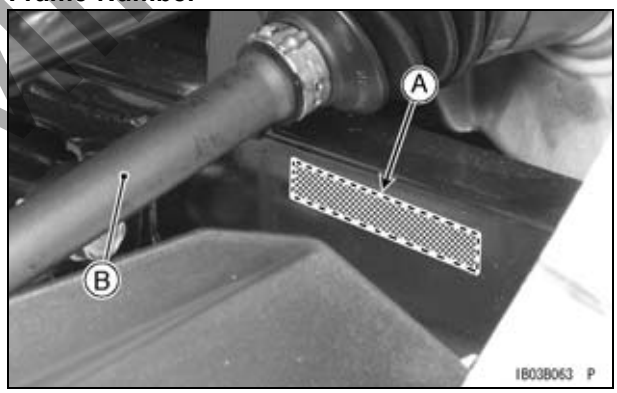
Model Identification

KRF750NAF, TAF Left Side View

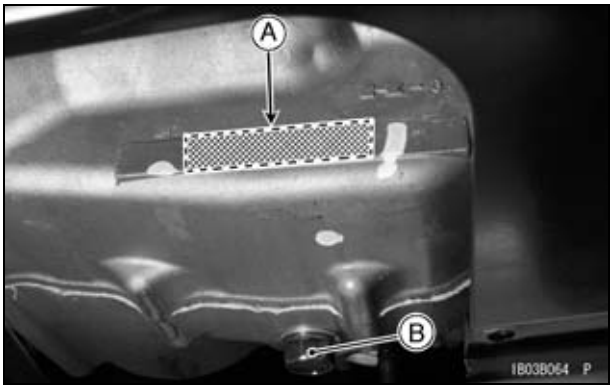
KRF750NAF, TAF Right Side View

Frame Number



[A] Frame Number
[B] Right Front Axle

Engine Number



[A] Engine Number
[B] Engine Oil Drain Plug

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Model Identification

KRF750PAF Left Side View

KRF750PAF Right Side View

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Model Identification

KRF750RAF Left Side View

KRF750RAF Right Side View

The KRF750RAF is identical to the KRF750PAF in every aspect: controls, features, and specifications except for the camouflage surface treatment.
The gun case is an optional part.

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Model Identification

KRF750SAF Left Side View

KRF750SAF Right Side View

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General Specifications

Items	KRF750NAF/PAF/RAF/SAF/TAF
Dimensions	
Overall Length	2 955 mm (116.3 in.)
Overall Width	1 485 mm (58.46 in.)
Overall Height :	
(KRF750N/S/T)	1 925 mm (75.79 in.)
(KRF750P/R)	2 020 mm (79.53 in.)
Wheelbase	1 930 mm (75.98 in.)
Tread:	
Front	1 225 mm (48.23 in.)
Rear	1 200 mm (47.24 in.)
Ground Clearance	295 mm (11.6 in.)
Seat Height	780 mm (30.7 in.)
Curb Mass:	
(KRF750N)	633 kg (1 396 lb), (CA) 630 kg (1 389 lb)
(KRF750P/R)	648 kg (1 429 lb), (CA) 645 kg (1 422 lb)
(KRF750S)	630 kg (1 389 lb), (CA) 627 kg (1 383 lb)
(KRF750T)	634 kg (1 398 lb)
Front:	
(KRF750N)	280 kg (617 lb), (CA) 279 kg (615 lb)
(KRF750P/R)	291 kg (642 lb), (CA) 289 kg (637 lb)
(KRF750S)	279 kg (615 lb), (CA) 278 kg (613 lb)
(KRF750T)	281 kg (620 lb)
Rear:	
(KRF750N/T)	353 kg (778 lb), (CA) 351 kg (774 lb)
(KRF750P/R)	357 kg (787 lb), (CA) 356 kg (785 lb)
(KRF750S)	351 kg (774 lb), (CA) 349 kg (770 lb)
Fuel Tank Capacity	28 L (7.9 US gal)
Cargo Bed (L × W × H)	830 × 1 120 × 280 mm (32.68 × 44.09 × 11.10 in.)
Seating Capacity	2
Performance	
Minimum Turning Radius:	
Differential Mode (2WD)	4.2 m (13.8 ft)
Locked-Axle Mode (4WD)	5.0 m (16.4 ft)
Engine	
Type	4-stroke, SOHC, V2-cylinders
Cooling System	Liquid-cooled
Bore and Stroke	85.0 × 66.0 mm (3.35 × 2.60 in.)
Displacement	749 cm³ (45.7 cu in.)
Compression Ratio	8.8 : 1
Maximum Horsepower	–
Maximum Torque	57 N·m (5.8 kgf·m, 42 ft·lb) @5 000 r/min (rpm)
Carburetion System	Fuel Injection (Mikuni ϕ34 × 2)
Starting System	Electric Starter
Ignition System	Battery and Coil (transistorized)

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General Specifications

Items	KRF750NAF/PAF/RAF/SAF/TAF
Timing Advance	Electronically advanced (digital)
Ignition Timing	10° BTDC @1 110 r/mi (rpm)
Spark Plug	NGK CR7E or DENSO U22ESR-N
Cylinder Numbering Method	Front to rear, 1-2
Firing Order	1-2
Valve Timing:	
Inlet:	
Open	20° BTDC
Close	44° ABDC
Duration	244°
Exhaust:	
Open	44° BBDC
Close	20° ATDC
Duration	244°
Lubrication System	Forced lubrication (wet sump)
Engine Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.6 L (2.7 US qt)
Drive Train	
Primary Reduction System:	
Type	Belt drive torque converter
Reduction Ratio	3.200 ~ 0.721
Transmission Gear Ratio:	
Forward:	
High	3.549 (30/26 × 29/18 × 21/11)
Low	5.536 (36/20 × 29/18 × 21/11)
Reverse	4.614 (16/12 × 18/16 × 29/18 × 21/11)
Final Drive System:	
Type	Shaft 4WD/2WD
Reduction Ratio	4.375 (35/8)
Overall Drive Ratio:	
Forward:	
High	11.195
Low	17.464
Reverse	14.553
Front Final Gear Case Oil:	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	0.7 L (0.74 US qt)
Rear Final Gear Case Oil:	
Type	MOBIL FLUID 424, CITGO TRANSGARD TRACTOR HYDRAULIC FLUID, EXXON HYDRAUL 560
Capacity	1.00 L (1.06 US qt)

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General Specifications

Items	KRF750NAF/PAF/RAF/SAF/TAF
Frame	
Type	Steel tube, Ladder
Caster (Rake Angle)	2.2°
Camber:	
(Front)	-0.7°
(Rear)	-0.4°
King Pin Angle	11.4°
Trail	11 mm (0.43 in.)
Tire:	
Front:	
Type	Tubeless
Size	26 × 8.00 - 12
Rear:	
Type	Tubeless
Size	26 × 10.00 - 12
Rim Size:	
Front	12 × 6.0AT
Rear	12 × 8.0AT
Steering Type	Rack and pinion
Suspension:	
Front:	
Type	Double Wishbone
Wheel Travel	190 mm (7.48 in.)
Rear:	
Type	Double Wishbone
Wheel Travel	190 mm (7.48 in.)
Brake Type:	
Front	Disc × 2
Rear	Enclosed wet multi-plate
Parking Brake Type	Enclosed wet multi-plate
Electrical Equipment	
Battery	(US) 12 V 14 Ah, (CA) 12 V 12 Ah
Headlight:	
Type	Semi-sealed beam
Bulb	12 V 35/35 W × 2
Brake/Tail Light	12 V 27/8 W × 2
Alternator:	
Type	Three - phase AC
Max Output	24 A, 14 V

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General Specifications

Items	KRF750NAF/PAF/RAF/SAF/TAF
Load Capacity	
Maximum Vehicle Load (Including Occupants and Cargo)	422 kg (931 lb)
Maximum Cargo Bed Load	227 kg (500 lb)

Specifications subject to change without notice, and may not apply to every country.

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Unit Conversion Table

Prefixes for Units:

Prefix	Symbol	Power
mega	M	× 1 000 000
kilo	k	× 1 000
centi	c	× 0.01
milli	m	× 0.001
micro	μ	× 0.000001

Units of Mass:

kg	×	2.205	=	lb
g	×	0.03527	=	oz

Units of Volume:

L	×	0.2642	=	gal (US)
L	×	0.2200	=	gal (imp)
L	×	1.057	=	qt (US)
L	×	0.8799	=	qt (imp)
L	×	2.113	=	pint (US)
L	×	1.816	=	pint (imp)
mL	×	0.03381	=	oz (US)
mL	×	0.02816	=	oz (imp)
mL	×	0.06102	=	cu in

Units of Force:

N	×	0.1020	=	kg
N	×	0.2248	=	lb
kg	×	9.807	=	N
kg	×	2.205	=	lb

Units of Length:

km	×	0.6214	=	mile
m	×	3.281	=	ft
mm	×	0.03937	=	in

Units of Torque:

N·m	×	0.1020	=	kgf·m
N·m	×	0.7376	=	ft·lb
N·m	×	8.851	=	in·lb
kgf·m	×	9.807	=	N·m
kgf·m	×	7.233	=	ft·lb
kgf·m	×	86.80	=	in·lb

Units of Pressure:

kPa	×	0.01020	=	kgf/cm²
kPa	×	0.1450	=	psi
kPa	×	0.7501	=	cmHg
kgf/cm²	×	98.07	=	kPa
kgf/cm²	×	14.22	=	psi
cmHg	×	1.333	=	kPa

Units of Speed:

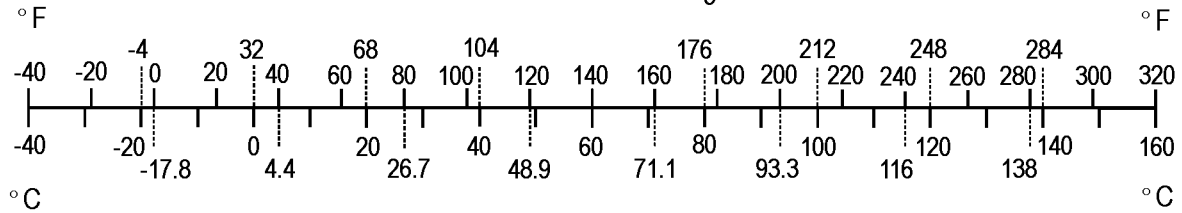
km/h	×	0.6214	=	mph

Units of Power:

kW	×	1.360	=	PS
kW	×	1.341	=	HP
PS	×	0.7355	=	kW
PS	×	0.9863	=	HP

Units of Temperature:

$$\frac{9(°C+40)}{5} - 40 = °F \qquad \frac{5(°F+40)}{9} - 40 = °C$$



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Periodic Maintenance

Table of Contents

Periodic Maintenance Chart 2-3
Torque and Locking Agent 2-5
Specifications 2-13
Special Tools 2-15
Periodic Maintenance Procedures 2-16
Fuel System 2-16
Throttle Pedal Free Play Inspection 2-16
Throttle Pedal Free Play Adjustment 2-16
Idle Speed Inspection 2-17
Idle Speed Adjustment 2-17
Air Cleaner Element Cleaning and Inspection 2-17
Air Cleaner Draining 2-18
Fuel Hose and Connections Inspection 2-18
Fuel Hose Replacement 2-19
Cooling System 2-20
Radiator Cleaning 2-20
Water Hoses and Connections Inspection 2-20
Coolant Change 2-20
Engine Top End 2-23
Valve Clearance Inspection 2-23
Valve Clearance Adjustment 2-25
Spark Arrester Cleaning 2-25
Converter System 2-26
Converter Drive Belt Wear Inspection 2-26
Drive Belt Deflection Inspection 2-28
Converter Drive Belt Deflection Adjustment 2-30
Actuator Lever (Engine Brake Control Lever) Assembly Inspection 2-30
Engine Lubrication System 2-31
Engine Oil Change 2-31
Oil Filter Replacement 2-32
Wheels/Tires 2-32
Tire Inspection 2-32
Wheels Nuts Tightness Inspection 2-33
Final Drive 2-33
Differential Shift Lever Play Inspection 2-33
Differential Shift Lever Play Adjustment 2-33
Front Final Gear Case Oil Change 2-33
Rear Final Gear Case Oil Change 2-34
Brakes 2-35
Brake Fluid Level Inspection 2-35
Brake Fluid Change 2-35
Brake Pedal Play Inspection 2-37
Brake Master Cylinder Cup and Dust Seal Replacement 2-37
Rear Brake Master Cylinder Cup, O-ring and Boot Replace 2-38
Brake Hose and Pipe Inspection 2-40
Brake Hose Replacement 2-41
Parking Brake Pedal Inspection 2-43
Front Brake Pad Wear Inspection 2-43
Front Brake Caliper Piston Seal and Dust Seal Replacement 2-44
Rear Brake Plates Replacement 2-45

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Steering 2-45
Steering Inspection 2-45
Steering Joint Dust Boot Inspection 2-46
Frame 2-46
Seat Belt Inspection 2-46
Electrical System 2-47
Spark Plug Cleaning/Inspection 2-47
Spark Plug Gap Inspection 2-47
Brake Light Switch Inspection 2-47
Brake Light Timing Adjustment 2-48
Joint Boots Inspection 2-48
Front Axle/Steering Knuckle Joint Boots Inspection 2-48
Front Propeller Shaft Joint Boots Inspection 2-48
Tie-rod End Boots Inspection 2-48
Rear Propeller Shaft Joint Boots Inspection 2-49
Rear Axle/Stabilizer Joint Boots Inspection 2-49
General Lubrication 2-49
Lubrication 2-49
Cables 2-50
Inspection 2-50
Bolts and Nuts Tightening 2-51
Tightness Inspection 2-51

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Periodic Maintenance Chart

The scheduled maintenance must be done in accordance with this chart to keep the vehicle in good running condition. **The initial maintenance is vitally important and must not be neglected.**

FREQUENCY / OPERATION	First Service		Regular Service				See Pape
	After 20 h, or 200 km (120 mile) of use	After 50 h, or 1 000 km (600 mile) of use	Every 50 h, or 1 000 km (600 mile) of use	Every 100 h, or 2 000 km (1 200 mile) of use	Every 200 h, or 4 000 km (2 500 mile) of use	Every year of use	
ENGINE							
Throttle pedal play-inspect		●				●	2-16
Fuel hoses and connections-inspect				●			2-18
Fuel hose-replace	4 years						2-19
Idle speed-inspect		●			●		2-17
Spark plug-clean and gap inspect	●				●		2-48
Air cleaner-inspect *	●		●				2-17
Valve clearance-inspect	First 2 000 km (1 200 mile); thereafter every 4 000 km (2 500 mile)						2-23
Spark arrester-clean				●			2-25
Engine oil-change *	●	6 month					2-31
Oil filter-replace *	●					●	2-32
Front and rear final gear case oil-change	●					●	2-33, 34
Radiator-clean *	●			●			2-20
Water hoses and connections-check *						●	2-20
Coolant-change *	2 years						2-20
Converter drive belt wear-inspect *					●		2-26
Converter drive belt deflection-inspect *	●				●		2-28
Differential shift lever play-inspect		●			●		2-33
Engine brake control lever-inspect *					●		2-31
CHASSIS							
Rear brake plates-replace *	every 10 000 km (6 000 mile)						2-45
Front brake pad wear-inspect *	●		●				2-43
Brake light switch - inspect	●				●		2-48
Brake fluid - change	2 years						2-36
Brake master cylinder cup and dust seal - replace	2 years						2-37
Rear brake master cylinder cup, O-ring, and boot-replace *	2 years						2-38
Front brake caliper piston seal and dust seal-replace	2 years						2-44
Brake hose - replace	4 years						2-41
Brake fluid level - inspect	●				●		2-35
Brake pedal play - inspect *		●			●		2-38

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2-4 PERIODIC MAINTENANCE

Periodic Maintenance Chart

FREQUENCY / OPERATION	First Service		Regular Service				See Pape
	After 20 h, or 200 km (120 mile) of use	After 50 h, or 1 000 km (600 mile) of use	Every 50 h, or 1 000 km (600 mile) of use	Every 100 h, or 2 000 km (1 200 mile) of use	Every 200 h, or 4 000 km (2 500 mile) of use	Every year of use	
Brake hose and pipe - inspect		●			●		2-40
Parking brake pedal - inspect		●			●		2-43
Tire wear-inspect *		●			●		2-32
Wheel nuts tightness - inspect		●			●		2-33
Joint boots - inspect	●		●				2-48
Steering-inspect		●			●		2-45
Steering joint dust boots - inspect		●			●		2-46
General lubrication - perform *					●		2-49
Bolts, nuts, and fasteners tightness - inspect		●		●			2-51
Seat belt - inspect					●		2-46
Cables - inspect					●		2-50

*: Service more frequently when operated in mud, dust, or other harsh riding conditions, or when carrying heavy loads or pulling a trailer.
●: Clean, adjust, lubricate, torque, or replace parts as necessary.

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Torque and Locking Agent

The following tables list the tightening torque for the major fasteners, and the parts requiring use of a non-permanent locking agent or liquid gasket.

Letters used in the “Remarks” column mean:
L: Apply a non-permanent locking agent.
LB: Apply a non-permanent locking agent (Three Bond TB2471, Blue).
LO: Apply a non-permanent locking agent (Three Bond TB2440B, Orange).
Lh: Left-hand Threads
MO: Apply molybdenum disulfide oil (mixture of the engine oil and molybdenum disulfide grease in a weight ratio: 10 : 1).
R: Replacement Parts
S: Follow the specific tightening sequence.
SS: Apply silicone sealant (Liquid Gasket, TB1211: 56019-120).

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Fuel System				
Element Holder Screw	4.5	0.46	40 in·lb	
Element Cover Screw	4.5	0.46	40 in·lb	
Air Cleaner Mounting Bolts	8.8	0.90	78 in·lb	L
ISC Valve Mounting Bolts	8.8	0.90	78 in·lb	
Delivery Pipe Mounting Screws	5.0	0.51	44 in·lb	
Inlet Air Pressure Sensor Mounting Screw	5.0	0.51	44 in·lb	
Throttle Cable Locknuts	4.4	0.45	39 in·lb	
Throttle Pedal Position Bolt Locknut	10.8	1.1	96 in·lb	
Fuel Pump Mounting Bolts	4.0	0.41	35 in·lb	
Fuel Tank Band Bolts	11	1.1	97 in·lb	
ECU Mounting Bolts	6.9	0.70	61 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Cooling System				
Radiator Screen Mounting Bolts	8.8	0.90	78 in·lb	
Radiator Cover Bracket Mounting Bolts	8.8	0.90	78 in·lb	
Radiator Mounting Bolts	8.8	0.90	78 in·lb	
Radiator Fan Assembly Bolts	8.3	0.85	73 in·lb	
Thermostat Housing Cover Bolts	8.8	0.90	78 in·lb	
Water Temperature Sensor	12	1.2	106 in·lb	
Water Pipe Mounting Bolts, L = 20 mm (0.79 in.)	8.8	0.90	78 in·lb	
Water Pipe Mounting Bolt, L = 12 mm (0.47 in.)	8.8	0.90	78 in·lb	
Water Pump Impeller	7.8	0.80	69 in·lb	
Water Pump Cover Bolts	8.8	0.90	78 in·lb	
Coolant Drain Plug (Water Pump)	7.0	0.71	62 in·lb	
Coolant Drain Plugs (Cylinder)	7.0	0.71	62 in·lb	
Coolant Air Bleed Bolt (Water Pump)	7.0	0.71	62 in·lb	
Coolant Air Bleed Bolt (Thermostat)	7.8	0.80	69 in·lb	
Engine Top End				
Valve Adjusting Cap Bolts	8.8	0.90	78 in·lb	
Rocker Case Bolts, L = 55 mm (2.2 in.)	8.8	0.90	78 in·lb	S
Rocker Case Bolts, L = 130 mm (5.1 in.)	9.8	1.0	87 in·lb	S

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rocker Case Bolts, L = 30 mm (1.2 in.)	9.8	1.0	87 in·lb	S
Rocker Case Bolts, L = 25 mm (1.0 in.)	9.8	1.0	87 in·lb	S
Cylinder Head Bolts (M10), first torque	25	2.5	18	S, MO
Cylinder Head Bolts (M10), final torque	49	5.0	36	S
Cylinder Head Bolts (M6)	9.8	1.0	87 in·lb	
Water Pipe Mounting Bolts	8.8	0.90	78 in·lb	
Valve Adjusting Screw Locknuts	12	1.2	106 in·lb	
Rocker Shaft Bolts	22	2.2	16	
Rear Rocker Case Clamp Bolt	8.8	0.90	78 in·lb	
Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
Chain Tensioner Cap Bolts	22	2.2	16	
Chain Tensioner Mounting Bolts	8.8	0.90	78 in·lb	
Front Cylinder Camshaft Chain Guide Bolt	20	2.0	15	
Position Plate Bolts	8.8	0.90	78 in·lb	
Intermediate Shaft Chain Guide Bolts	8.8	0.90	78 in·lb	
Intermediate Shaft Chain Tensioner Bolts	8.8	0.90	78 in·lb	
Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	15	
Cylinder Bolts, L = 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
Cylinder Bolts, L = 40 mm (1.6 in.)	9.8	1.0	87 in·lb	
Coolant Drain Plugs (Cylinder)	7.0	0.71	62 in·lb	
Exhaust Pipe Nuts	17	1.7	13	
Exhaust Pipe Cover Bolts	13	1.3	115 in·lb	
Muffler Clamp Bolts	15	1.5	11	
Muffler Mounting Bolts	28	2.9	21	
Spark Arrester Mounting Bolts	13	1.3	115 in·lb	
Converter System				
Drive Pulley Bolt	93	9.5	69	Lh
Drive Pulley Cover Bolts	12.5	1.3	111 in·lb	
Ramp Weight Nuts	7.0	0.71	62 in·lb	R
Spider	275	28	203	Lh
Driven Pulley Nut	93	9.5	69	R
Engine Brake Actuator Mounting Bolts	8.8	0.90	78 in·lb	S
Engine Brake Actuator Cover Bolt	8.8	0.90	78 in·lb	S
Belt Inspection Opening Cover Bolts	8.8	0.90	78 in·lb	
Converter Cover Bolts	8.8	0.90	78 in·lb	S
Converter Cover Drain Bolt	20	2.0	15	
Joint Duct Bolts	8.8	0.90	78 in·lb	
Engine Lubrication System				
Oil Filter	17.5	1.8	13	R
Oil Pressure Switch	15	1.5	11	SS
Oil Pipe Bolts	8.8	0.90	78 in·lb	
Engine Oil Drain Plug	20	2.0	15	
Oil Pressure Relief Valve	15	1.5	11	L

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Oil Pump Cover Bolts	8.8	0.90	78 in·lb	
Chain Guide Bolt	8.8	0.90	78 in·lb	
Oil Pump Drive Chain Tensioner Bolt	25	2.5	18	
Oil Filter Mounting Bolt	25	2.5	18	L (15 mm)
Plate Bolts	8.8	0.90	78 in·lb	
Engine Removal/Installation				
Engine Bracket Pipe Mounting Nuts	41.5	4.2	31	R
Engine Mounting Bolt	60.1	6.1	44	
Engine Mounting Nut	60.1	6.1	44	R
Crankshaft/Transmission				
Connecting Rod Big End Cap Nuts	34.3	3.5	25	MO
Engine Oil Drain Plug	20	2.0	15	
Crankcase Bolts (M8), L = 75 mm (2.95 in.)	20	2.0	15	S
Crankcase Bolts (M8), L = 110 mm (4.33 in.)	20	2.0	15	S
Crankcase Bolt (M8), L = 110 mm (4.33 in.)	20	2.0	15	S, L (1)
Crankcase Bolts (M6), L = 40 mm (1.57 in.)	9.8	1.0	87 in·lb	
Crankcase Bolts (M6), L = 65 mm (2.56 in.)	9.8	1.0	87 in·lb	
Bearing Position Plate Screws	4.9	0.50	43 in·lb	
Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	15	
Grip Hold Nut	9.8	1.0	87 in·lb	
Tie-rod End Locknut	19.6	2.0	14	
Shift Lever Assembly Nut	19.6	2.0	14	R
Tie-rod End Bolt	9.8	1.0	87 in·lb	
Tie-rod End Front Locknut	9.8	1.0	87 in·lb	Lh
Tie-rod End Rear Locknut	9.8	1.0	87 in·lb	
Tie-rod End Nut	19.6	2.0	14	R
Shift Shaft Lever Bolt	13.5	1.4	10	
Shift Shaft Cover Bolts	8.8	0.90	78 in·lb	
Shift Shaft Positioning Bolt	25	2.5	18	
Neutral Position Switch	15	1.5	11	
Reverse Position Switch	15	1.5	11	
Shift Shaft Spring Bolt	25	2.5	18	LB
Wheel/Tires				
Front Axle Nuts	266	27.1	196	
Front Wheel Nuts	110	11.2	81	S
Rear Wheel Nuts	110	11.2	81	S
Tie-rod End Locknuts	44	4.5	32	
Rear Axle Nuts	266	27.1	196	
Final Drive				
(Output Bevel Gears)				
Rotor Mounting Bolts	12	1.2	106 in·lb	
Output Driven Bevel Gear Housing Bolts	26	2.7	19	
Bevel Gear Bearing Holder Nut	200	20.4	148	LB

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Bearing Holder (M64)	120	12.2	89	L
Bearing Holder (M75)	250	25.5	184	L
Output Shaft Holder Nut	200	20.4	148	LB
Output Drive Bevel Gear Housing Bolts	26	2.7	19	
Output Drive Bevel Gear Cover Bolt, L = 65 mm (2.56 in.)	8.8	0.90	78 in·lb	
Output Drive Bevel Gear Cover Bolts, L = 20 mm (0.79 in.)	8.8	0.90	78 in·lb	
Forward/Reverse Detecting Sensor Mounting Bolt	14.9	1.5	11	
(Front Final Gear Case)				
Differential Control Shift Shaft Lever Nut	8.8	0.90	78 in·lb	R
Differential Shift Cable Holder Bolt	8.8	0.90	78 in·lb	
Front Final Gear Case Oil Filler Cap	29	3.0	21	
Front Final Gear Case Oil Drain Plug	15	1.5	11	
2WD/4WD Shift Cable Holder Bolts	8.8	0.90	78 in·lb	L
2WD/4WD Shift Shaft Cover Bolts	8.8	0.90	78 in·lb	L
2WD/4WD Shift Shaft Lever Nut	20	2.0	15	R
Pinion Gear Bearing Holder Nut	200	20.4	148	LB
Pinion Gear Bearing Holder	250	25.5	184	LO
Coupling Nut	35	3.6	26	R
Front Final Gear Case Center Cover Bolts (M8)	24	2.4	18	L
Front Final Gear Case Center Cover Bolts (M10)	49	5.0	36	L
Ring Gear Bolts	57	5.8	42	LB
Front Final Gear Case Left Cover Bolts (M6, 35 mm)	8.8	0.90	78 in·lb	
Front Final Gear Case Left Cover Bolts (M6, 40 mm)	8.8	0.90	78 in·lb	
Front Final Gear Case Mounting Nuts	90.5	9.2	67	R
Front Final Gear Case Bracket Bolts	90.5	9.2	67	
Differential Shift Cable Locknuts	9.8	1.0	87 in·lb	
2WD/4WD Shift Cable Locknuts	4.4	0.45	39 in·lb	
4WD Position Switch	15	1.5	11	
Vacuum Actuator Bracket Bolts	8.8	0.90	78 in·lb	
Solenoid Valve Bracket Bolts	8.8	0.90	78 in·lb	
Vacuum Actuator Mounting Bolts	8.8	0.90	78 in·lb	
(Rear Final Gear Case)				
Rear Master Cylinder Mounting Bolts	27	2.8	20	L
Rear Master Cylinder Bleed Valve	7.8	0.80	69 in·lb	
Rear Final Gear Case Front Cover Bolts	24	2.4	18	
Spring Bracket Bolt	8.8	0.90	78 in·lb	L
Rear Final Gear Case Gasket Screws	1.3	0.13	12 in·lb	
Pinion Gear Bearing Holder	450	45.9	332	L
Pinion Gear Bearing Holder Nut	200	20.4	148	LB
Rear Final Gear Case Oil Drain Plug	15	1.5	11	
Rear Final Gear Case Oil Filler Cap	29	3.0	21	

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Rear Final Gear Case Right Cover Bolts (M10)	49	5.0	36	L
Rear Final Gear Case Right Cover Bolts (M12)	94	9.6	69	L
Rear Final Gear Case Mounting Nuts	90.5	9.2	67	R
Rear Final Gear Case Bracket Bolts	90.5	9.2	67	
Heat Guard Bolts	8.8	0.90	78 in·lb	
Brakes				
Front Master Cylinder Reservoir Cap	3.4	0.35	30 in·lb	
Reservoir Clamp Bolt	6.2	0.63	55 in·lb	
Piston Stop Bolt	8.8	0.90	78 in·lb	
Brake Pipe Nipples	17.5	1.8	13	
Brake Pipe Joint	17.5	1.8	13	
Brake Hose Banjo Bolts	23.5	2.4	17	
Front Master Cylinder Mounting Bolts	23.5	2.4	17	
Master Cylinder Bolt	23.5	2.4	17	
Push Rod Locknut	17.2	1.8	13	
Parking Brake Pedal Assy Mounting Bolts	41.5	4.2	31	
Front Brake Pad Mounting Bolts	17.2	1.8	13	
Caliper Bleed Valves	7.8	0.80	69 in·lb	
Brake Hose Clamp Bolts	8.8	0.90	78 in·lb	L
Caliper Holder Shaft	17.2	1.8	13	
Brake Caliper Mounting Bolts	33	3.4	24	L
Front Brake Disc Mounting Bolts	41.5	4.2	31	L
Parking Brake Position Switch Screws	0.4	0.04	4 in·lb	
Rear Master Cylinder Bleed Valve	7.8	0.80	69 in·lb	
Rear Master Cylinder Mounting Bolts	27	2.8	20	L
Rear Final Gear Case Front Cover Bolts	24	2.4	18	
Spring Bracket Bolt	8.8	0.90	78 in·lb	L
Rear Final Gear Case Gasket Screws	1.3	0.13	12 in·lb	
Suspension				
Front Shock Absorber Mounting Nuts	57.5	5.9	42	R
Front Suspension Arm Pivot Nuts	87.5	8.9	65	R
Steering Knuckle Joint Nuts	46.5	4.7	34	
Rear Shock Absorber Mounting Nuts	95.5	9.7	70	R
Rear Suspension Arm Pivot Nuts	87.5	8.9	65	R
Rear Knuckle Mounting Nuts	57.5	5.9	42	R
Stabilizer Joint Nuts	57.5	5.9	42	R
Stabilizer Holder Bolts	31.5	3.2	23	L
Steering				
Steering Wheel Mounting Nut	54	5.5	40	R
Steering Knuckle Joint Nuts	46.5	4.7	34	
Main Shaft Mounting Bolts	41.5	4.2	31	
Intermediate Shaft Clamp Bolts	21.5	2.2	17	
Steering Gear Assembly Nuts	95.5	9.7	70	R

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Tie-rod End Locknuts	44	4.5	32	
Tie-rod End Nuts	41.5	4.2	31	
Frame				
Right and Left Bar Mounting Bolts	98	10	72	
Upper Bar Mounting Bolts	46.5	4.7	34	
Back Bar Mounting Bolts	46.5	4.7	34	
Bottom Guard Bolts	8.8	0.90	78 in·lb	
Front Guard Bolts	31.5	3.2	23	
Seat Belt Case Mounting Nuts	46.5	4.7	34	
Seat Belt Mounting Bolts	41.5	4.2	31	
Seat Belt Buckle Mounting Bolts	46.5	4.7	34	
Seat Plate Bolts	8.8	0.90	78 in·lb	L
Brake Pedal Bracket Mounting Bolts, L = 20 mm (0.79 in.)	34.3	3.5	25	L
Brake Pedal Bracket Mounting Bolts, L = 30 mm (1.2 in.)	34.3	3.5	25	
Center Bracket Mounting Bolts	22	2.2	16	
Right Frame Pipe Mounting Bolts	34.3	3.5	25	
Bracket Bolts	47	4.8	35	
Heart Guard Bolts	8.8	0.90	78 in·lb	
Electrical System				
Starter Motor Mounting Bolts	8.8	0.90	78 in·lb	
Starter Motor Terminal Locknut	11	1.1	97 in·lb	
Starter Motor Cable Mounting Nut	6.8	0.69	60 in·lb	
Starter Motor Through Bolts	5.0	0.51	44 in·lb	
Starter Motor Clutch Bolts	34	3.5	25	L
Left Engine Cover Bolts	5.9	0.60	52 in·lb	L
Alternator Rotor Bolt	127	13.0	94	
Alternator Cover Plugs	17.5	1.8	13	
Crankshaft Sensor Mounting Bolts	5.9	0.60	52 in·lb	
Alternator Stator Bolts	13.5	1.4	10	
Alternator Cover Bolts, L = 55 mm (2.17 in.)	8.8	0.90	78 in·lb	
Alternator Cover Bolts, L = 30 mm (1.18 in.)	8.8	0.90	78 in·lb	
Breather Plate Screws	2.9	0.30	26 in·lb	L
Ignition Coil Mounting Bolts	5.9	0.60	52 in·lb	
Spark Plugs	13	1.3	115 in·lb	
Vacuum Actuator Bracket Bolts	8.8	0.90	78 in·lb	
Solenoid Valve Bracket Bolts	8.8	0.90	78 in·lb	
ECU Mounting Bolts	6.9	0.70	61 in·lb	
Engine Brake Actuator Mounting Bolts	8.8	0.90	78 in·lb	S
Engine Brake Actuator Cover Bolt	8.8	0.90	78 in·lb	S
Forward/Reverse Detecting Sensor Mounting Bolt	14.9	1.5	11	
Speed Sensor Mounting Bolt	8.8	0.90	78 in·lb	

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Torque and Locking Agent

Fastener	Torque			Remarks
	N·m	kgf·m	ft·lb	
Reverse Position Switch	15	1.5	11	
Neutral Position Switch	15	1.5	11	
4WD Position Switch	15	1.5	11	
Water Temperature Sensor	12	1.2	106 in·lb	
Radiator Fan Assembly Bolts	8.3	0.85	73 in·lb	
Oil Pressure Switch	15	1.5	11	SS
Battery Holder Mounting Nuts	16	1.6	12	
Regulator/Rectifier Mounting Bolts	8.8	0.90	78 in·lb	

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2-12 PERIODIC MAINTENANCE

Torque and Locking Agent

The tables below, relating tightening torque to thread diameter, lists the basic torque for the bolts and nuts. Use this table for only the bolts and nuts which do not require a specific torque value. All of the values are for use with dry solvent-cleaned threads.

Basic Torque for General Fasteners of Engine Parts

Threads dia. mm (in.)	Mark of bolt head	Torque		
		N·m	kgf·m	ft·lb
5 (0.20)	4T	2.2 ~ 2.6	0.22 ~ 0.27	19 ~ 23 in·lb
6 (0.24)	9T	12 ~ 15	1.2 ~ 1.5	104 ~ 130 in·lb
6 (0.24)	7T	7.8 ~ 9.8	0.8 ~ 1.0	69 ~ 87 in·lb
6 (0.24)	4T	3.9 ~ 4.9	0.4 ~ 0.5	35 ~ 43 in·lb
8 (0.31)	7T	18 ~ 22	1.8 ~ 2.2	13 ~ 16
8 (0.31)	4T	10 ~ 14	1.0 ~ 1.4	87 ~ 122 in·lb
10 (0.39)	7T	39 ~ 44	4.0 ~ 4.5	29 ~ 33
10 (0.39)	4T	20 ~ 24	2.0 ~ 2.4	14 ~ 17

Basic Torque for General Fasteners of Frame Parts

Threads dia. mm (in.)	Torque		
	N·m	kgf·m	ft·lb
5 (0.20)	3.4 ~ 4.9	0.35 ~ 0.50	2.5 ~ 3.6
6 (0.24)	5.9 ~ 7.8	0.60 ~ 0.80	4.3 ~ 5.8
8 (0.31)	14 ~ 19	1.40 ~ 1.90	10 ~ 13
10 (0.39)	25 ~ 34	2.60 ~ 3.50	19 ~ 25
12 (0.47)	44 ~ 61	4.50 ~ 6.20	33 ~ 45
14 (0.55)	73 ~ 98	7.40 ~ 10.0	54 ~ 72
16 (0.63)	115 ~ 155	11.5 ~ 16.0	83 ~ 115
18 (0.71)	165 ~ 225	17.0 ~ 23.0	125 ~ 165
20 (0.79)	225 ~ 325	23.0 ~ 33.0	165 ~ 240

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Specifications

Item	Standard	Service Limit
Fuel System		
Throttle Pedal Free Play	5 ~ 10 mm (0.20 ~ 0.39 in.)	– – –
Idle Speed	1 100 ±50 r/min (rpm)	– – –
Air Cleaner Element Oil	High-quality foam air filter oil	– – –
Cooling System		
Coolant:		
Type (Recommended)	Permanent type of anitfreze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	– – –
Color	Green	– – –
Mixed Ratio	Soft water 50%, Coolant 50%	– – –
Freezing Point	−35°C (−31°F)	– – –
Total Amount	4.4 L (4.7 US qt)	– – –
Engine Top End		
Valve Clearance:		
Exhaust	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)	– – –
Inlet	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)	– – –
Converter System		
Belt Width	30.0 ~ 30.6 mm (1.181 ~ 1.205 in.)	28.6 mm (1.126 in.)
Belt Deflection	22 ~ 31 mm (0.87 ~ 1.22 in.) (at checking) 22 ~ 27 mm (0.87 ~ 1.06 in.) (at adjusting)	– – –
Actuator Lever Guide Shoe Wear	– – –	6 mm (0.24 in.)
Engine Lubrication System		
Engine Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Capacity	2.4 L (2.5 US qt) (When filter is not removed)	– – –
	2.5 L (2.6 US qt) (When filter is removed)	– – –
	2.6 L (2.7 US qt) (When engine is completely dry)	– – –
Wheels/Tires		
Tire Tread Depth:		
Front	– – –	4 mm (0.16 in.)
Rear	– – –	4 mm (0.16 in.)
Standard tire:		
Front	26 × 8.00-12	– – –
	MAXXIS, M989, Tubeless	– – –
Rear	26 × 10.00-12	– – –
	MAXXIS, M990, Tubeless	– – –

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Specifications

Item	Standard	Service Limit
Final Drive		
Front Final Gear Case:		
Gear Case Oil:		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Oil Level	Filler opening bottom	– – –
Capacity	0.7 L (0.74 US qt)	– – –
Rear Final Gear Case:		
Gear Case Oil:		
Type	MOBIL FLUID 424, CITGO TRANSGARD TRACTOR HYDRAULIC FLUID or EXXON HYDRAUL 560	– – –
Oil Level	Filler opening bottom	– – –
Capacity	1.0 L (1.06 US qt)	– – –
Brakes		
Brake Fluid:		
Type	DOT 3	– – –
Brake Pads:		
Pad Lining Thickness	3.9 mm (0.15 in.)	1 mm (0.04 in.)
Brake Pedal:		
Brake Pedal Play	2 ~ 10 mm (0.08 ~ 0.39 in.)	– – –
Steering		
Steering Wheel Free Play	0 ~ 20 mm (0 ~ 0.79 in.)	– – –
Electrical System		
Spark Plug Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –
Rear Brake Light Switch Timing	ON after 10 mm (0.4 in.) of pedal travel	– – –

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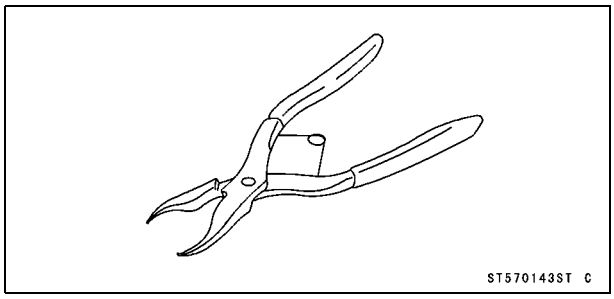
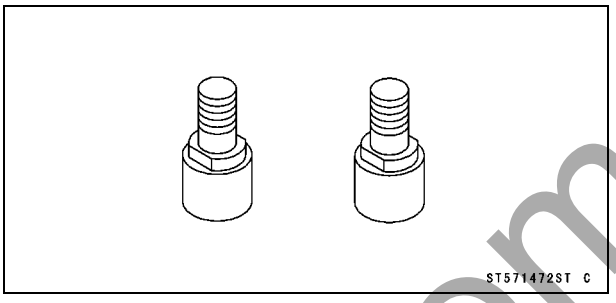
Special Tools

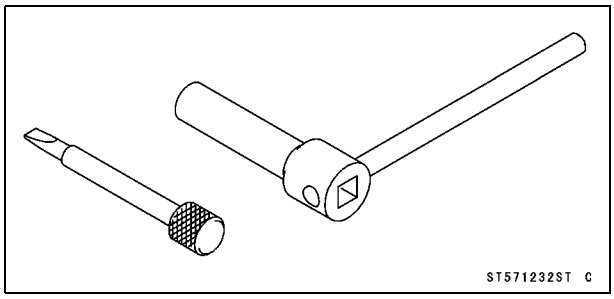
Inside Circlip Pliers:
57001-143



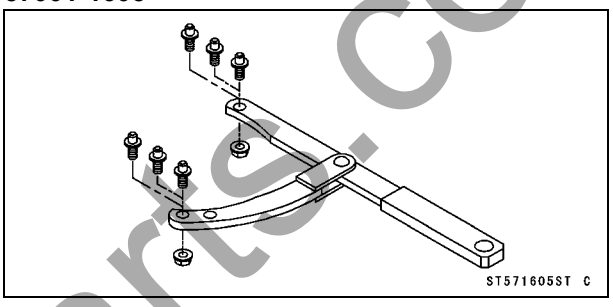
Pulley Holder Attachment:
57001-1472



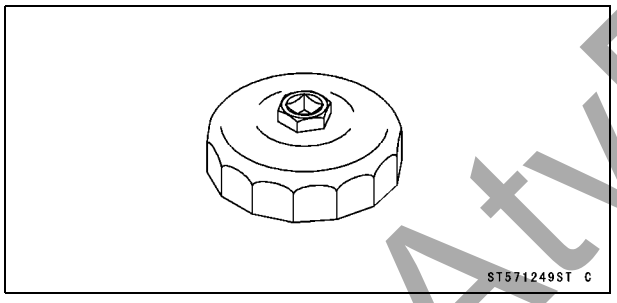
Valve Adjuster:
57001-1232



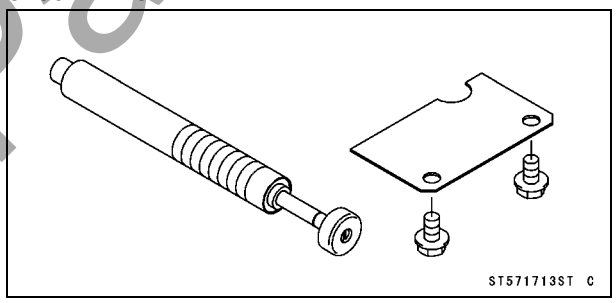
Flywheel & Pulley Holder:
57001-1605



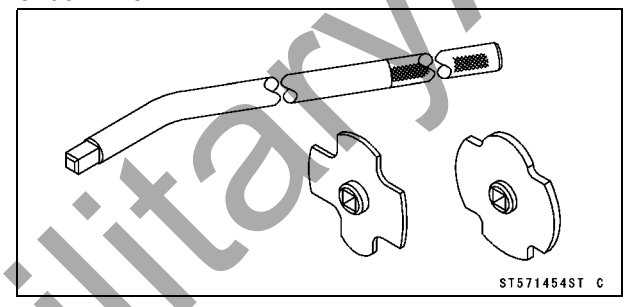
Oil Filter Wrench:
57001-1249



Belt Deflection Gauge:
57001-1713



Filler Cap Driver:
57001-1454



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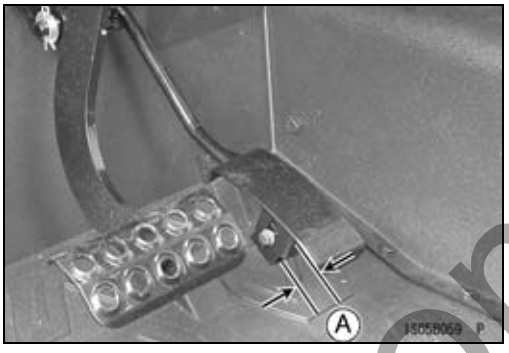
Periodic Maintenance Procedures

Fuel System

Throttle Pedal Free Play Inspection



- Check that the throttle pedal moves smoothly from full open to close.

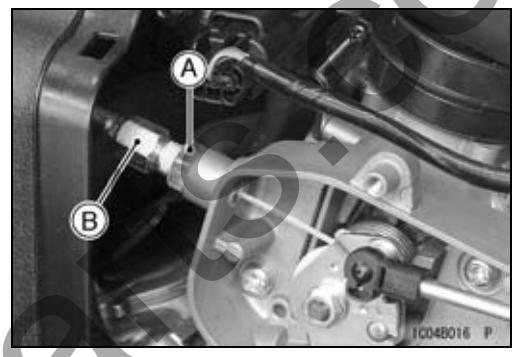
★If the throttle pedal does not return properly, lubricate the throttle cable (see Throttle Cable Lubrication in the Fuel System chapter).

- Check the throttle pedal play [A].

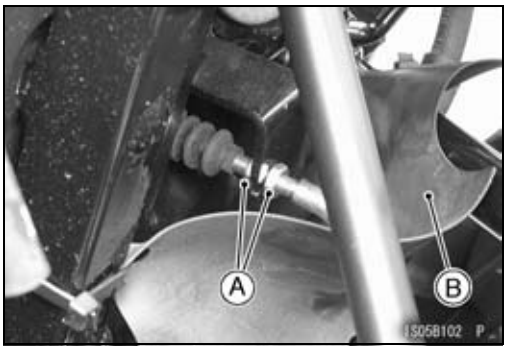
Throttle Pedal Play
Standard: 5 ~ 10 mm (0.20 ~ 0.39 in.)

★If the play is incorrect, adjust the throttle cable.

Throttle Pedal Free Play Adjustment



- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Throttle Link Case Cover
- Loosen the locknut [A] and turn the adjusting nut [B] on the throttle cable until the cable has proper amount of play.
- Tighten the locknut securely after adjustment.
- Install:
  Throttle Link Case Cover
  Engine Upper Cover (see Engine Upper Cover Installation in the Frame chapter)



★If the free play cannot be adjusted by using the rear cable adjusting nut, use the cable adjusting nuts [A] at front of the floorboard and make the necessary free play.

○Move the rubber seat [B].

- Start the engine.
- With the transmission in neutral, operate the throttle pedal a few times to make sure that the idle speed does not change.

★If the idle speed does change, the throttle cable may be improperly adjusted, incorrectly routed, or it may be damaged.

- Correct any of these conditions before operation.

⚠ WARNING

Operation with improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding condition. Follow the service manual to be make sure to correct any of these conditions.

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Periodic Maintenance Procedures

Idle Speed Inspection

- Start the engine and warm it up thoroughly.
- Check the idle speed with a suitable tachometer.

★If the idle speed is out of the specified range, check the ISC valve (see ISC Valve Inspection) and vacuum hoses.

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

Idle Speed Adjustment

NOTE

○*Idle speed adjustment is best performed by ECU, so idle speed cannot be adjusted.*

Air Cleaner Element Cleaning and Inspection

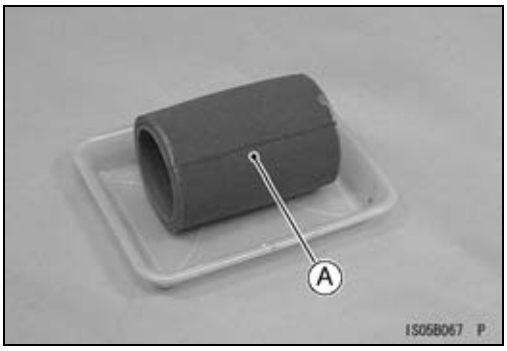
NOTE

○*In dusty areas, the element should be cleaned more frequently than the recommended interval.*
○*After riding through rain or muddy terrains, the element should be cleaned immediately.*
○*Also, if there is a break in the element material or any other damage to the element, replace the element with a new one.*

⚠ WARNING

Gasoline and low-flash point solvents can be flammable and/or explosive and cause severe burns. Clean the element in a well-ventilated area, and take care that there is no spark or flame anywhere near the working areas. Do not use gasoline or low-flash point solvents to clean the element.

- Remove the air cleaner element (see Air Cleaner Element Removal in the Fuel System chapter).
- Clean the element [A] in a bath of high-flash point solvent.



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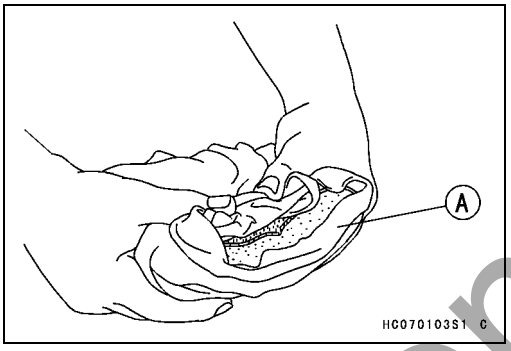
Periodic Maintenance Procedures

- Squeeze it dry in a clean towel [A]. Do not wring the element or blow it dry; the element can be damaged.
- Inspect the element for damage.

★If it is torn, punctured, or hardened, replace it.

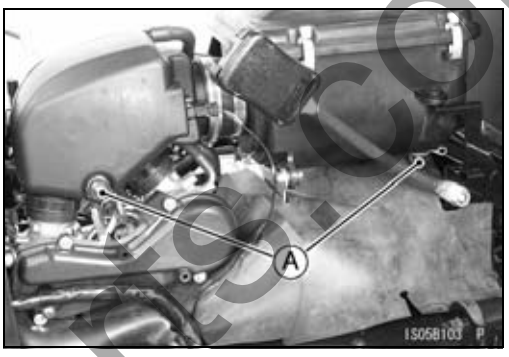
- After cleaning, saturate the element with a high-quality foam-air-filter oil, squeeze out the excess oil, then wrap it in a clean rag and squeeze it as dry as possible. Be careful not to tear the element.
- Install the air cleaner element (Air Cleaner Element Installation in the fuel system chapter).



Air Cleaner Draining

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Lift up the cargo bed.

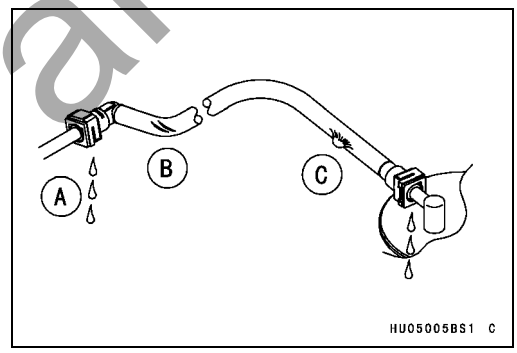
★If any water or oil accumulates in the drain boots [A] , drain it by removing the boots. After draining, be sure to install the drain boots and clamps firmly.



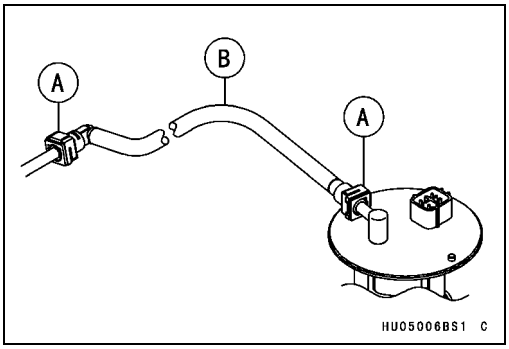
Fuel Hose and Connections Inspection

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Check the fuel hose.

★Replace the fuel hose if any fraying, leaks [A], cracks [B] or bulges [C] are noticed.



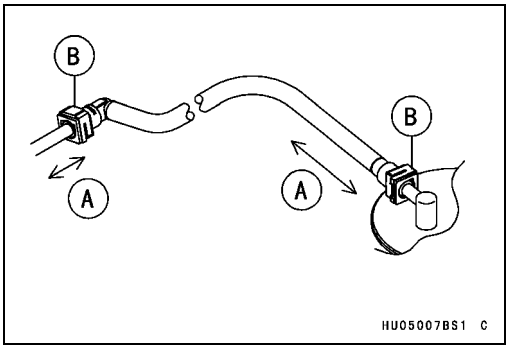
★Replace the hose if it has been sharply bent or kinked.
Hose Joints [A]
Fuel Hose [B]



- Check that the fuel hose joints are securely connected.

○Push and pull [A] the fuel hose joint [B] back and forth more than two times, and make sure it is locked.

★If it does not locked, reinstall the hose joint.



⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in serious burns. Make sure the hose joint is installed correctly on the delivery pipe by sliding the joint.

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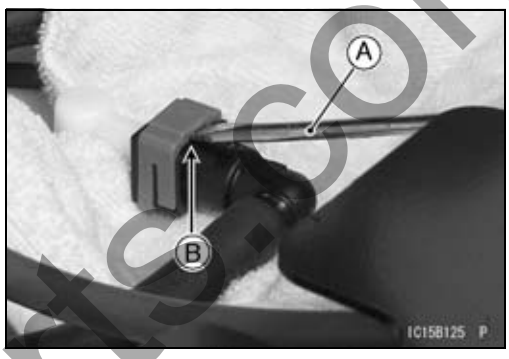
Periodic Maintenance Procedures

Fuel Hose Replacement

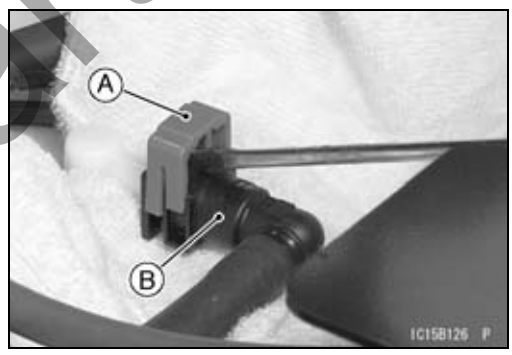
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions. Turn the ignition switch OFF. Do not smoke. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light.

- Be sure to place a piece of cloth around the fuel hose joint.
- Insert a thin standard tip screwdriver [A] into the slit [B] on the joint lock.



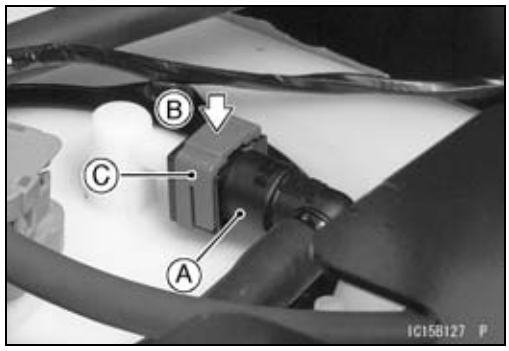
- Twist the screwdriver to disconnect the joint lock [A].
- Pull the fuel hose joint [B] out of the delivery pipe.



⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe. Cover the hose connection with a clean shop towel to prevent fuel spillage.

- Install the new fuel hose.
- Insert the fuel hose joint [A] straight onto the delivery pipe until the hose joint clicks.
- Push [B] the joint lock [C].



- Push and pull the fuel hose joint [A] back and forth more than two times and make sure it is locked and doesn't come off.

⚠ WARNING

Leaking fuel can cause a fire or explosion resulting in severe burns. Make sure the fuel hose joint is installed correctly on the delivery pipe and that it doesn't leak.

★If it comes off, reinstall the hose joint.

- Start the engine and check the fuel hose for leaks.

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Periodic Maintenance Procedures

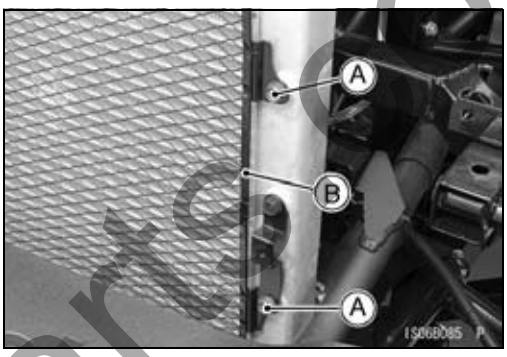
Cooling System

Radiator Cleaning

NOTICE

Clean the radiator screen and the radiator in accordance with the Periodic Maintenance Chart. In dusty areas, they should be cleaned more frequently than the recommended interval. After riding through muddy terrains, the radiator screen and the radiator should be cleaned immediately.

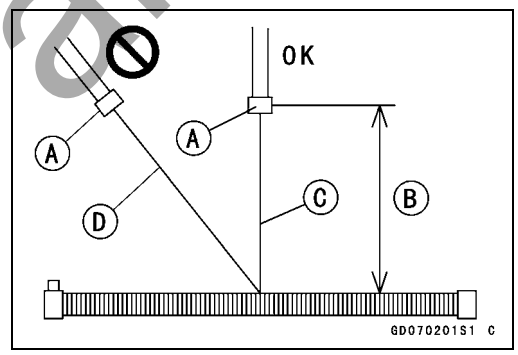
- Remove the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove:
  Radiator Cover (see Radiator Removal in the Cooling chapter)
  Radiator Screen Mounting Screws [A] (bothside)
  Radiator Screen [B]
- Clean the radiator screen in a bath of tap water, and then dry it with compressed air or by shaking it.



- Clean the radiator.

NOTICE

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage.
Keep the steam gun [A] away more than 0.5 m (20 in.) [B] from the radiator core.
Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface.
Run the steam gun following the core fin direction.

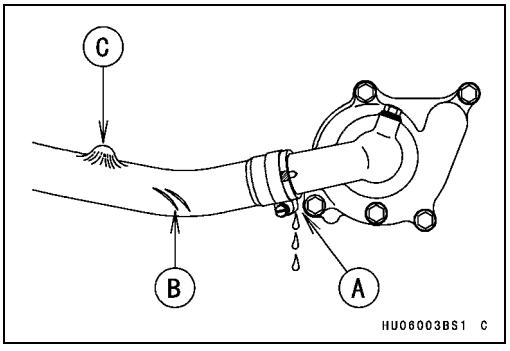


Water Hoses and Connections Inspection

○The high pressure inside the water hose can cause coolant to leak [A] or the hose to burst if the line is not properly maintained. Visually inspect the hoses for signs of deterioration. Squeeze the hoses. A hose should not be hard and brittle, nor should it be soft or swollen.

★Replace the hose if any fraying, cracks [B] or bulges [C] are noticed.

- Check that the hoses are securely connected and clamps are tightened correctly.



Coolant Change

⚠ WARNING

Coolant can be extremely hot and cause severe burns, is toxic and very slippery. Do not remove the radiator cap or attempt to change the coolant when the engine is hot; allow it cool completely. Immediately wipe any spilled coolant from tires, frame, engine or other painted parts. Do not ingest coolant.

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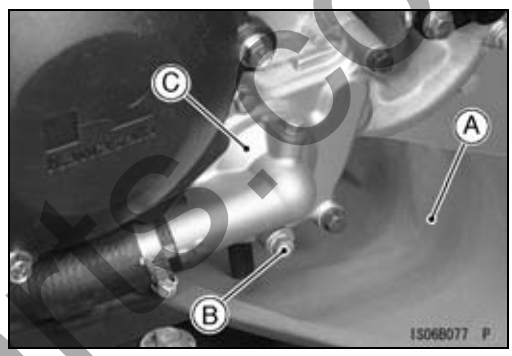
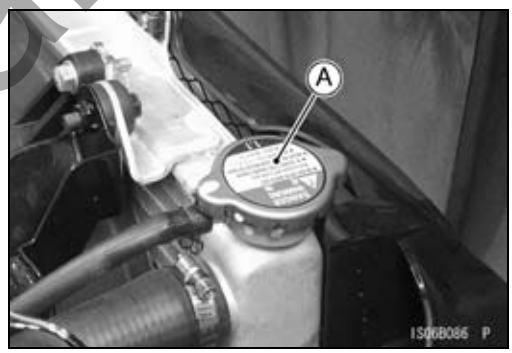
Periodic Maintenance Procedures

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Left Cover (see Left Cover Removal in the Frame chapter)
  Engine Bottom Guard (see Engine Bottom Guard Removal in the Frame chapter)
- Place a container and a suitable paper [A] or plate under the drain plug [B] at the bottom of the water pump cover [C], and then remove the drain plug.

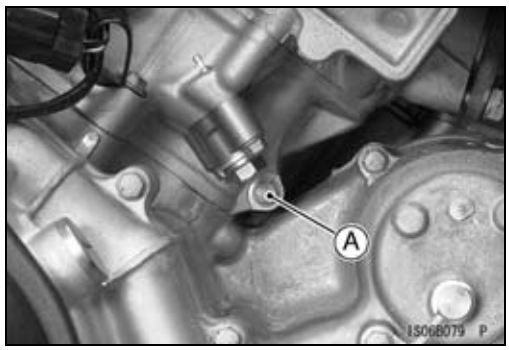


- Remove the radiator cap [A] in two steps. First, turn the cap counterclockwise to the first step. Then push and turn it further in the same direction and remove the cap.
- The coolant will drain from the radiator and engine.



- Remove:
  Torque Converter Inlet Duct
- Place a container under the drain plug [A] at the front cylinder, then remove the drain plug.

- Place a container under the drain plug [A] at the rear cylinder, then remove the drain plug.



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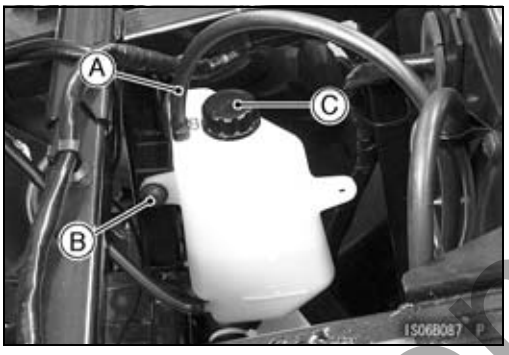
Periodic Maintenance Procedures

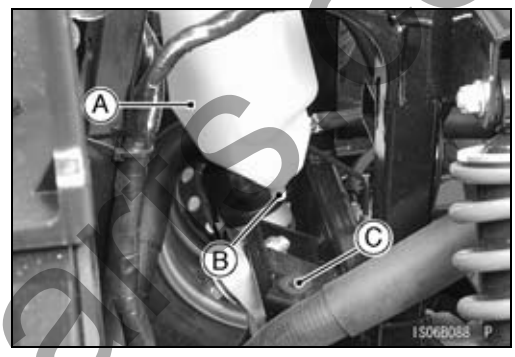
- Remove:
  Overflow Hose [A] and Clamp
  Screw [B]
- Remove the reserve tank cap [C], and pour the coolant into a container.



- Install the water hoses to the water pipes and tighten the clamp screw.
- Install:
  Overflow Hose and Clamp
  Reserve Tank [A]

○Insert the projection [B] into the grommet [C].

- Tighten the screws.



- Fill the radiator up to the radiator filler neck [A] with coolant.

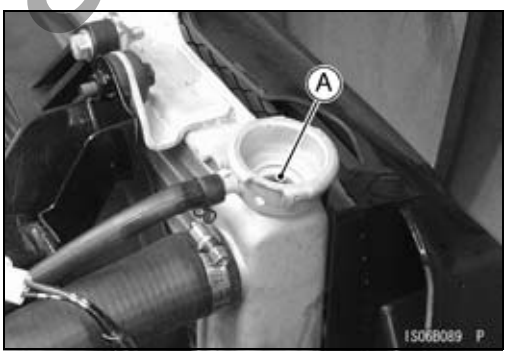
NOTE

○*Pour in the coolant slowly so that the air in the engine and radiator can escape.*

- Fill the reserve tank up to the F (Full) level line with coolant.

NOTE

○*Pour in the coolant slowly so that the air in the engine and radiator can escape.*



NOTICE

Soft or distilled water must be used with the antifreeze in the cooling system.
If hard water is used in the system, it causes scale accumulation in the water passages, considerably reducing the efficiency of the cooling system.

Water and Coolant Mixture Ratio (when shipping)

Soft Water:	**50%**
Coolant:	**50%**
Freezing Point:	**−35°C (−31°F)**
Total Amount:	**4.4 L (4.7 US qt)**

NOTE

○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

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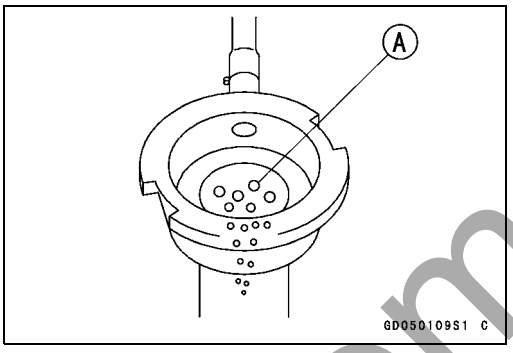
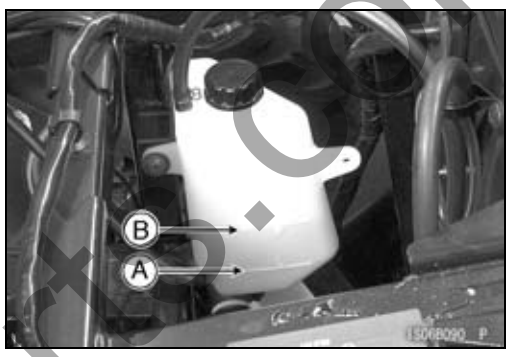
Periodic Maintenance Procedures

● Bleed the air from the cooling system as follows.
○Start the engine with the radiator cap removed and run it until no more air bubbles [A] can be seen in the coolant.
○Tap the radiator hoses to force any air bubbles caught inside.
○Stop the engine and add coolant up to the radiator filler neck.
● Install the radiator cap.



● Start the engine, warm it up thoroughly until the radiator fan turns on and then stop the engine.
● Check the coolant level in the reserve tank after the engine cools down.
★If the coolant level is lower than the L (Low) level line [A], add coolant to the F (Full) level line [B].



NOTICE
Do not add more coolant above the full level line.

● Install the reserve tank cap.

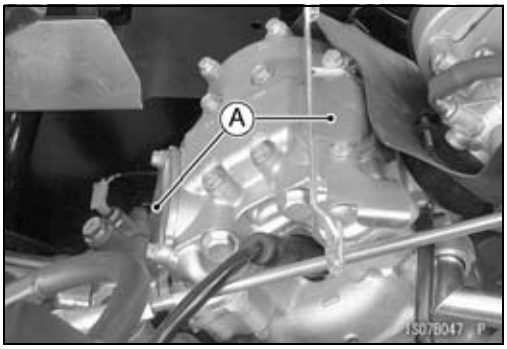
Engine Top End

Valve Clearance Inspection

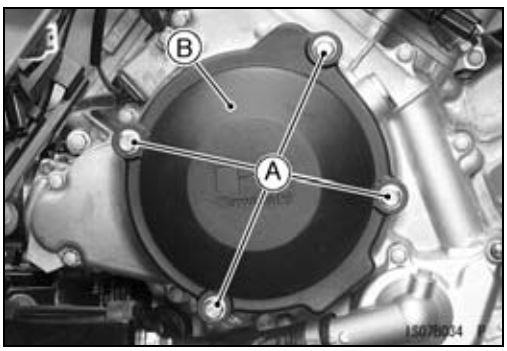
NOTE

○*Check the valve clearance only when the engine is cold (at room temperature).*

● Remove:
Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
Air Cleaner Housing and Duct (see Air Cleaner Housing and Duct Removal in the Fuel System (DFI) chapter)
Air Outer Duct (see Torque Converter Cover Removal in the Converter System chapter)
Center Bracket (see Center Bracket Removal in the Frame chapter)
Valve Adjusting Caps [A]



● Remove:
Left Cover (see Left Cover Removal in the Frame chapter)
Bolts [A] and Engine Left Cover [B]



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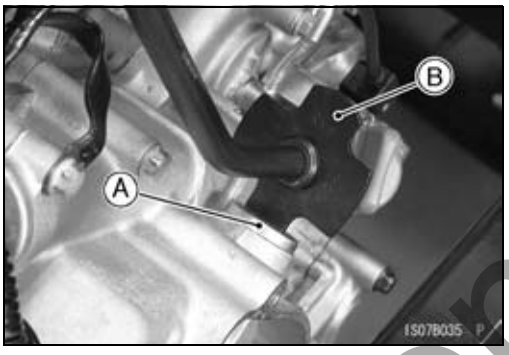
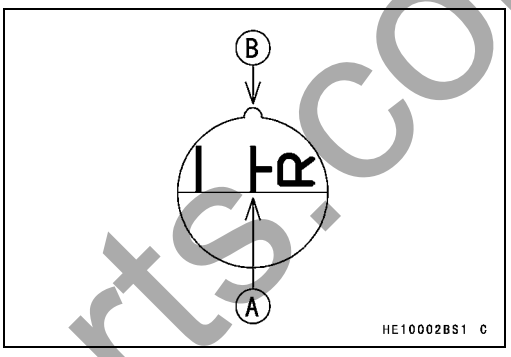
Periodic Maintenance Procedures

● Remove the timing inspection plug [A].

Special Tool - Filler Cap Driver [B]: 57001-1454



● Turn the crankshaft **counterclockwise** with a wrench on the alternator rotor bolt until “T-R” mark [A] on the alternator rotor aligns with the notch [B] as shown: the end of the compression stroke in the rear cylinder head.



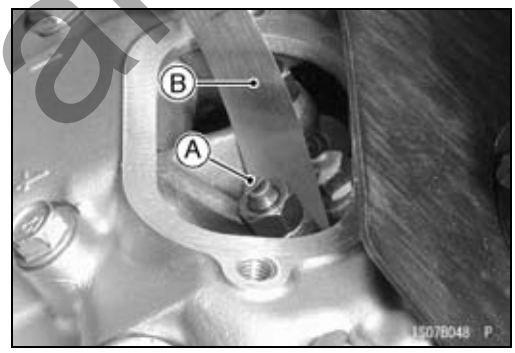
● Measure the clearance for all four valves, one at a time between the end of the valve stem and the adjusting screw [A] with the thickness gauge [B].

Valve Clearance (when cold)

Exhaust 0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)

Inlet 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)

★If the valve clearance is not correct, adjust it (see Valve Clearance Adjustment).



● Then, turn the crankshaft **counterclockwise** with a wrench on the alternator rotor bolt until “T-F” mark [A] on the alternator rotor aligns with the notch [B] as shown: the end of the compression stroke in the front cylinder head.

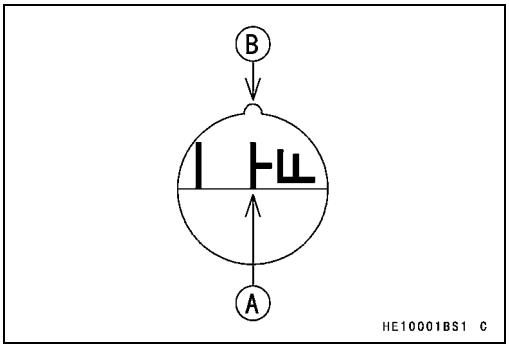
● Measure the clearance for all four valves, one at a time between the end of the valve stem and the adjusting screw with the thickness gauge.

Valve Clearance (when cold)

Exhaust 0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)

Inlet 0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)

★If the valve clearance is not correct, adjust it (see Valve Clearance Adjustment).



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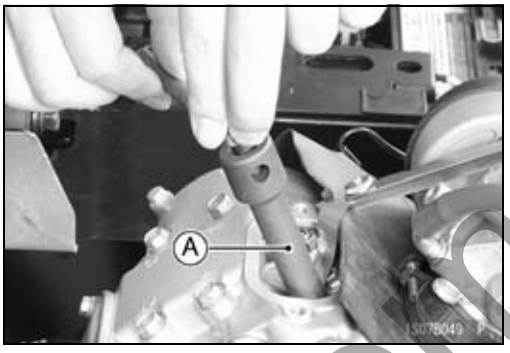
Periodic Maintenance Procedures

Valve Clearance Adjustment



- Remove the valve adjusting caps.
- Loosen the locknut and turn the adjusting screw until the clearance is correct.
- Using the valve adjuster [A], hold the adjusting screw from turning and tighten the locknut.

Special Tool - Valve Adjuster: 57001-1232

Torque - Valve Adjusting Screw Locknuts: 12 N·m (1.2 kgf·m, 106 in·lb)

- Recheck the clearance.

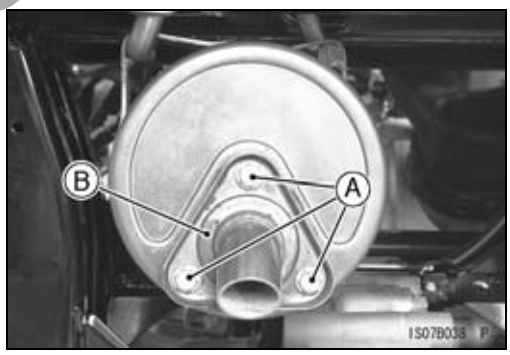
★If the clearance is incorrect, repeat the adjustment procedure.

★If the clearance is correct, perform the adjustment procedure on the other valve.

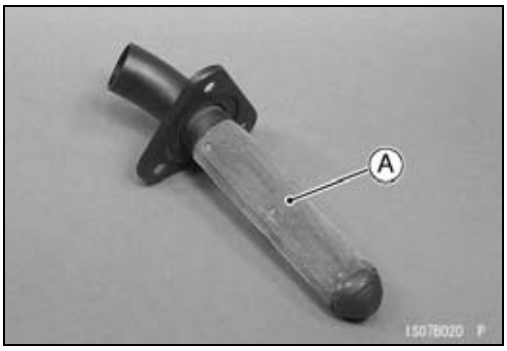
Spark Arrester Cleaning

⚠ WARNING

The muffler can become extremely hot during normal operation and cause severe burns. Since the engine must be running during this procedure, wear heat-resistant gloves while cleaning the spark arrester.



- Remove:
  Bolts [A]
  Spark Arrester [B]



- Clean the spark arrester [A] in a bath of high-flash point solvent and if necessary use a fine wire brush to gently remove any particles in the screen.

- In an open area away from combustible materials, start the engine with the transmission in neutral.
- Raise and lower engine speed while tapping on the muffler with a rubber mallet until carbon particles are purged from the muffler.

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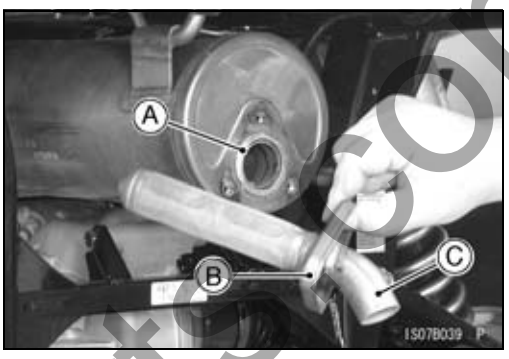
Periodic Maintenance Procedures

⚠ DANGER

Exhaust gas contains carbon monoxide, a colorless, odorless poisonous gas. Inhaling carbon monoxide can cause serious brain injury or death. DO NOT run the engine in enclosed areas. Operate only in a well-ventilated area.

- Stop the engine.
- Apply grease to the new gasket [A] and install it on the muffler.
- Install the spark arrester [B] so that the opening [C] of the pipe faces downward.
- Tighten:

Torque - Spark Arrester Mounting Bolts: 13 N·m (1.3 kgf·m, 115 in·lb)



Converter System

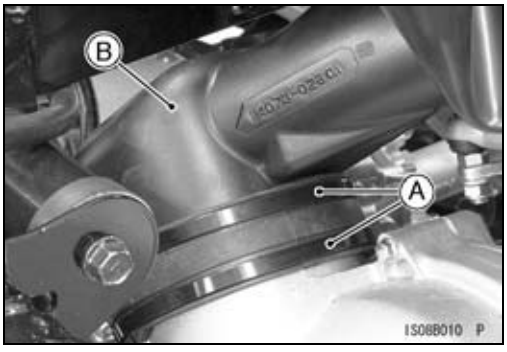
Converter Drive Belt Wear Inspection

Inspection of the drive belt is required at least every 200 hours, 6 months of vehicle use or 4 000 km (2 500 mi.) whichever comes first. An average day of use is calculated as 20 km (13 mi.) per day or 1.1 hours. More frequent inspection is necessary if the vehicle is subjected to hard usage.

⚠ WARNING

Neglect, abuse, or failure to maintain the transmission can result in a severely worn or damaged drive belt locking up the transmission and wheels. This can cause the operator to lose control and have an accident resulting in injury or death. Maintain according to periodic maintenance chart.

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Bands [A] (cut)
  Air Outlet Duct [B]



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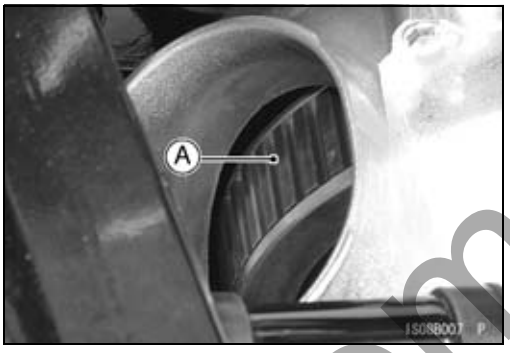
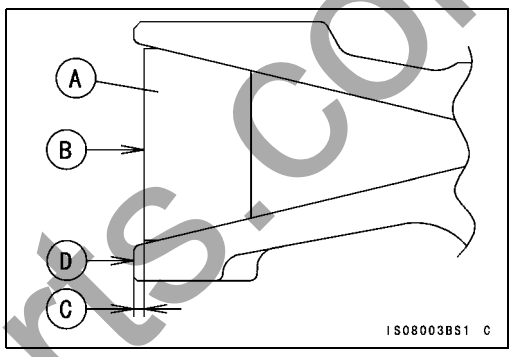
Periodic Maintenance Procedures

● Check the belt [A] for breaks.
★If necessary, replace the belt.



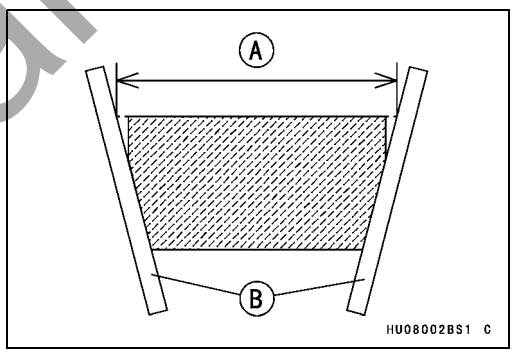
● Push the drive belt [A] between the driven sheaves and check the belt position in the driven sheaves.
★If the upper surface [B] of the drive belt is lowered 1.5 mm (0.059 in.) [C] or more from the edge [D] of sheaves, check the belt wear as follows.



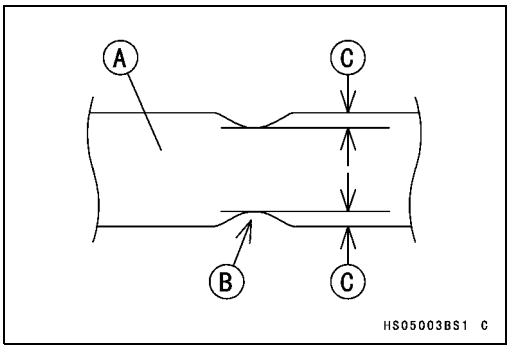
● Remove the torque converter cover (see Torque Converter Cover Removal in the Converter System chapter).
● Measure the width [A] of the belt at several locations with a pair of suitable straightedges [B] as shown.
★If any measurements exceed the service limit, replace the belt.

Belt Width

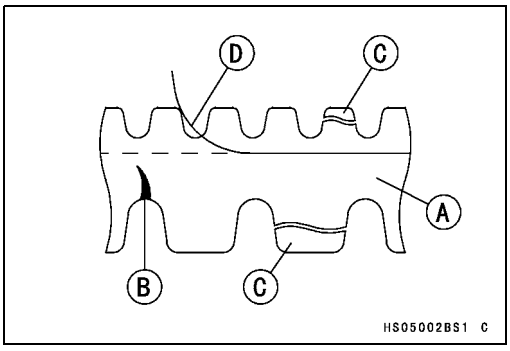
Standard:	**30.0 ~ 30.6 mm (1.181 ~ 1.205 in.)**
Service Limit:	**28.6 mm (1.126 in.)**



● Check the belt [A] for abnormal wear [B].
○Measure the width [C] of the belt at abnormal wear point.
★If any measurements exceed 0.5 mm (0.02 in.), replace the belt.



● Check the belt for cracks, breaks, or peeling.
★If necessary, replace the belt.
Belt [A]
Crack [B]
Broken [C]
Peeling [D]



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Periodic Maintenance Procedures

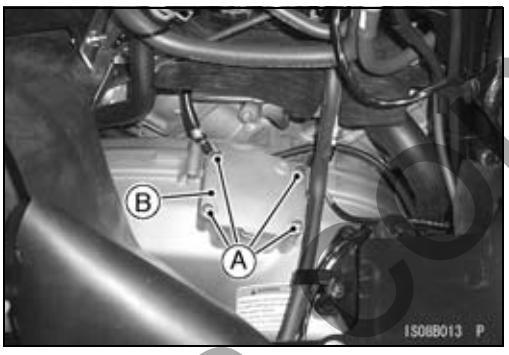
NOTE

○*Whenever the belt is replaced, inspect the drive and the driven pulleys.*

- Install the air outlet duct (see Torque Converter Cover Installation in the Converter System chapter).

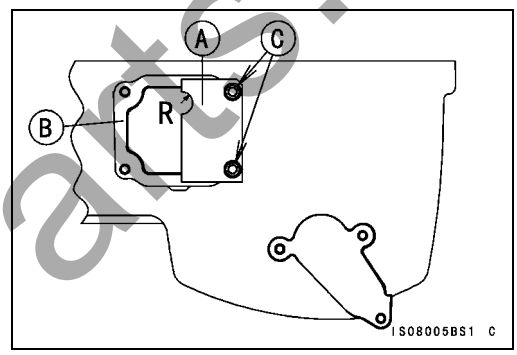
Drive Belt Deflection Inspection

- Put the transmission in neutral and rotate the driven pulley by hand to make sure the belt is shifted all the way to the top of the driven pulley.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Bolts [A]
  Clamp [B]
  Cover [C]



- Set the cover plate [A] on the torque converter cover [B] with two bolts [C].

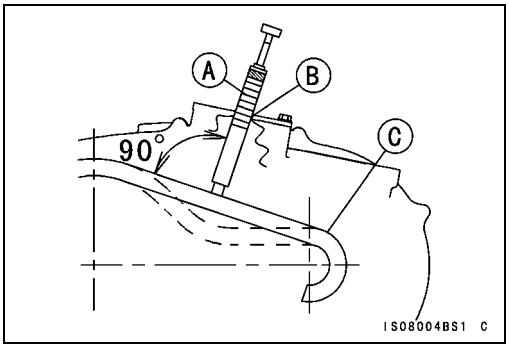
Special Tool - Belt Deflection Gauge: 57001-1713



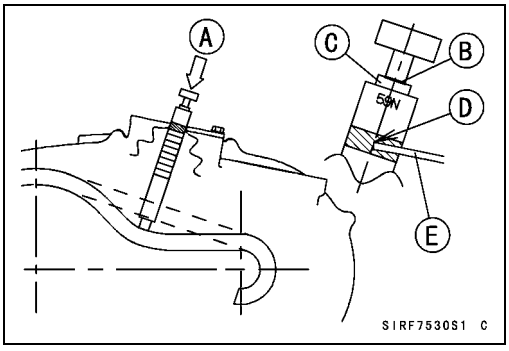
- Put the belt deflection gauge [A] along with the semi-circle cutout [B] in the cover plate and let the flat end of the gauge contact at right angle to the belt [C].

NOTE

○*Take care not to drop the gauge in the converter cover.*



- Press [A] the gauge head until the 59 N (6 kgf, 13 lb) scale line [B] aligns with the top end of the stopper [C].
- Make a line mark [D] on the gauge at the upper surface of the cover plate [E].



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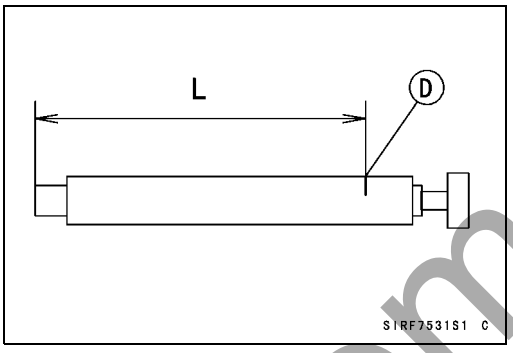
Periodic Maintenance Procedures



- Remove the gauge and measure the distance [L] between the mark [D] and the gauge bottom end.
- Calculate the belt deflection [H].

H = L (mm) – 82.4 (mm) or

H = L (in.) – 3.24 (in.) Belt Deflection

Belt Deflection

Standard:	**22 ~ 31 mm (0.87 ~ 1.22 in.) (at checking)**

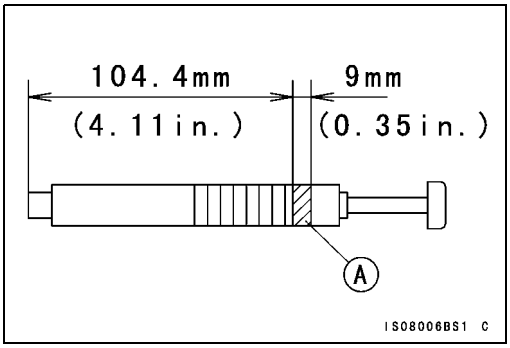
(For reference) The 82.4 mm (3.24 in.) is the distance between the top surface of cover plate and the design base point of the drive belt for measuring.

★If the belt deflection is not within the specified range, adjust the deflection by adding or removing spacers on the fixed sheave of the driven pulley.

NOTE

○*This is timesaving preliminary drive belt deflection measuring method. When recheck the belt deflection after deflection adjustment, follow the standard method described below.*

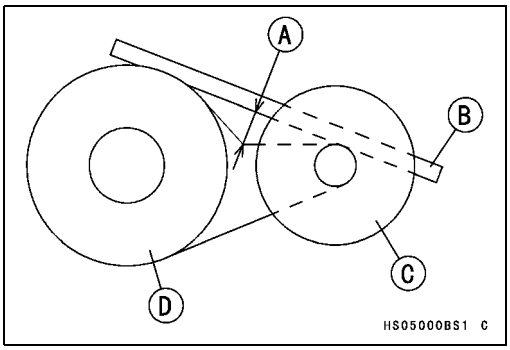
○*If the belt deflection is not within the standard, adjust it by adding or removing spacers on the fixed sheave of the driven pulley.*



NOTE

○*For easy drive belt deflection judgment, put a 9 mm wide tape [A] at the position on the belt deflection gauge as shown in the figure. With this tool the technician can judge the deflection directly by checking the position of the tape against the cover plate.*

Standard Drive Belt Deflection Measurement



- After deflection adjustment, check the belt deflection before installing the CVT cover following the method described below.
- Measure the belt deflection [A] at the middle of two pulleys with a straightedge, the belt deflection gauge and a ruler.
- Place a straightedge [B] on top of the belt between the drive pulley [C] and the driven pulley [D].
- Push the belt away from the straightedge with the belt deflection gauge. Press the gauge head until the 59 N scale line aligns with the top end of the stopper.

Belt Deflection

Standard:	**22 ~ 27 mm (0.87 ~ 1.06 in.) (at adjusting)**

★If the belt deflection is not within the specified range, adjust the deflection again.

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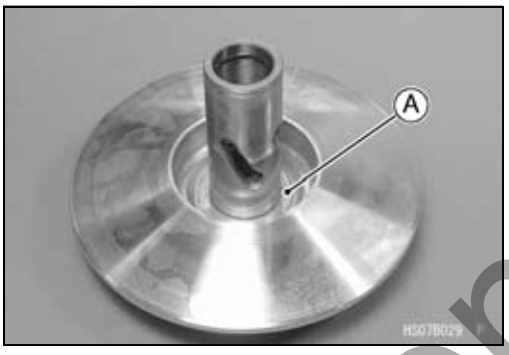
Periodic Maintenance Procedures

Converter Drive Belt Deflection Adjustment



- Disassemble the driven pulley (see Driven Pulley Disassembly in the Converter System chapter).

★If the belt deflection is more than 31 mm (1.22 in.), remove the spacers to decrease it.

○The rule-of-thumb is: 0.1 mm (0.004 in.) change in spacer thickness equals about 1.3 mm (0.051 in.) change in belt deflection.

★If the adjustment cannot be done within the specified range even if the shim is removed, replace the drive belt.

★If the belt deflection is less than 22 mm (0.87 in.), add the spacers [A] to increase it.

○The rule-of-thumb is: 0.1 mm (0.004 in.) change in spacer thickness equals about 1.6 mm (0.063 in.) change in belt deflection.

NOTE

○*When using the plural spacers, install the thick spacer to the movable sheave side and thin spacer to the fixed sheave side.*

Spacers

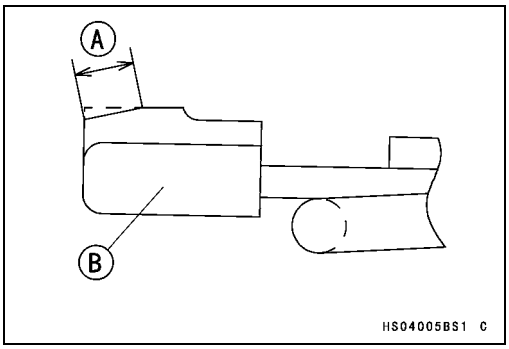
Part No.	Thickness
92026-0034	0.3 mm (0.012 in.)
92026-1569	0.6 mm (0.024 in.)
92026-1617	0.8 mm (0.031 in.)
92026-1565	1.0 mm (0.039 in.)
92026-1570	1.4 mm (0.055 in.)

- Assemble the driven pulley (see Driven Pulley Assembly in the Converter System chapter).
- With the transmission in neutral, rotate the driven pulley to allow the belt to return to the top of the sheaves before measuring the belt deflection.
- Measure the belt deflection again and repeat the above procedures until it is within the standard range.
- Using the flywheel & pulley holder and pulley holder attachment, tighten the new driven pulley nut.

Special Tools - Flywheel & Pulley Holder: 57001-1605
Pulley Holder Attachment: 57001-1472

Torque - Driven Pulley Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)

Actuator Lever (Engine Brake Control Lever) Assembly Inspection



- Remove the torque converter cover (see Torque Converter Cover Removal in the Converter System chapter).
- Measure the width [A] of the plastic guide shoe [B] of the actuator lever assembly.

★If the guide contact area width is greater than the service limit, replace the actuator lever assembly.

Actuator Lever Guide Shoe
Service Limit: 6 mm (0.24 in.)

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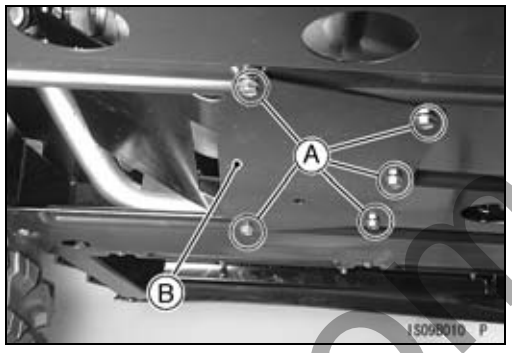
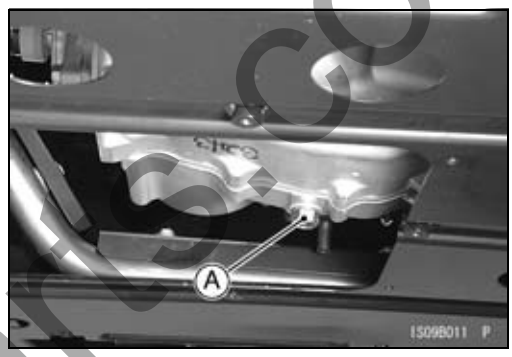
Periodic Maintenance Procedures

Engine Lubrication System

Engine Oil Change



- Remove:
  Bottom Guard Bolts [A]
  Bottom Guard [B]

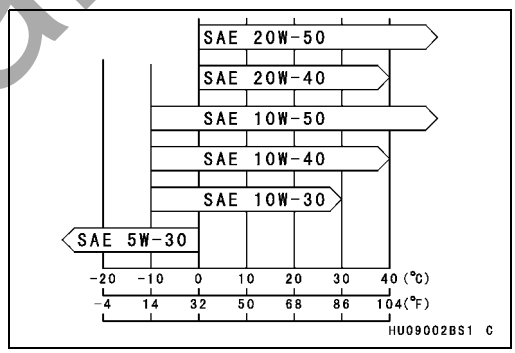


- Support the vehicle so that it is level, both side to side and front to rear after warming up the engine.
- Remove the engine oil drain plug [A] to drain the oil.

○The oil in the filter can be drained by removing the filter (see Oil Filter Change).

- Replace the oil drain plug gasket with a new one.
- Tighten:

Torque - Engine Oil Drain Plug: 20 N·m (2.0 kgf·m, 15 ft·lb)



- Pour in the specified type and amount of oil.

Engine Oil

Type:	**API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**
Viscosity:	**SAE 10W-40**
Amount:	**2.4 L (2.5 US qt)**
	(When filter is not removed)
	2.5 L (2.6 US qt)
	(When filter is removed)
	2.6 L (2.7 US qt)
	(When engine is completely dry)

NOTE

○*Although 10W-40 engine oil is the recommended oil for most conditions, the oil viscosity may need to be changed to accommodate atmospheric conditions in your riding area.*

- Install:
  Bottom Guard (see Engine Bottom Guard Installation in the Frame chapter)

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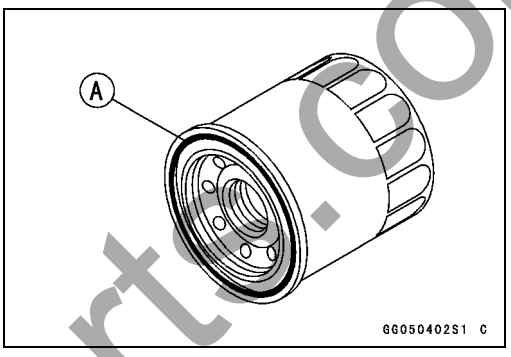
Periodic Maintenance Procedures

Oil Filter Replacement

- Remove:
  Engine Bottom Guard (see Engine Bottom Guard Removal in the Frame chapter)
- Drain the engine oil.
- Remove the oil filter [A] with the oil filter wrench [B].

Special Tool - Oil Filter Wrench: 57001-1249



- Replace the filter with a new one.
- When installing the oil filter, be careful of the following.

○Apply oil to the gasket [A] before installation.
○Tighten the filter with the oil filter wrench.

Special Tool - Oil Filter Wrench: 57001-1249

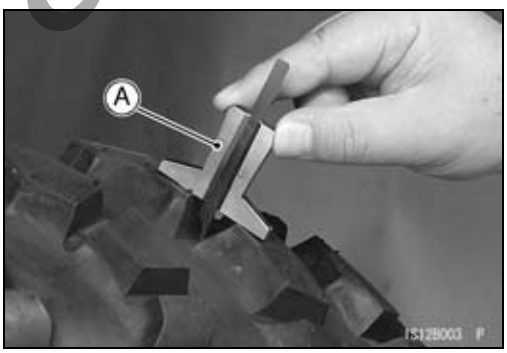
Torque - Oil Filter: 17.5 N·m (1.8 kgf·m, 13 ft·lb)

○Pour in the specified type and amount of oil.

- Install:
  Engine Bottom Guard (see Engine Bottom Guard Installation in the Frame chapter)

Wheels/Tires

Tire Inspection



- Examine the tire for damage and wear.

★If the tire is cut or cracked, replace it.
○Lumps or high spots on the tread or sidewalls indicate internal damage requiring tire replacement.
○Remove any foreign objects from the tread. After removal, check for leaks with a soap and water solution.

- Measure the tread depth at the center of the tread with a depth gauge [A]. Since the tire may wear unevenly, take measurements at several places.

★If any measurements are less than the service limit, replace the tire.

Tire Tread Depth
Service Limit:
Front 4 mm (0.16 in.)
Rear 4 mm (0.16 in.)

Standard Tire
Front: 26 × 8.00 - 12
MAXXIS, M989, Tubeless
Rear: 26 × 10.00 - 12
MAXXIS, M990, Tubeless

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Periodic Maintenance Procedures

Wheels Nuts Tightness Inspection

- Check the tightness of all the wheel nuts.

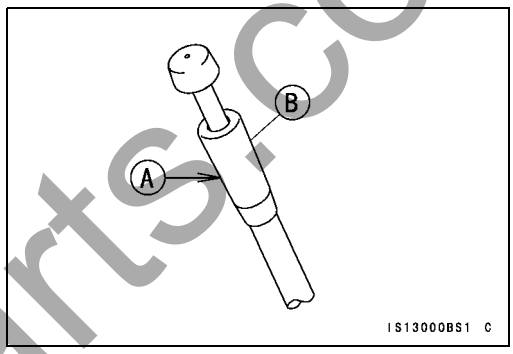
★If there are loose nut, first loosen by 1/2 turn, then re-torque them to the specified torque.

Torque - Wheel Nuts: 137 N·m (14 kgf·m, 101 ft·lb)

○Tighten the wheel nuts [1] ~ [4] in a criss-cross pattern.

Final Drive

Differential Shift Lever Play Inspection



- Check the differential shift lever travel by feeling clicks.
- Push the center [A] of the damper [B] with 98 N (10 kgf, 22 lbf) of force.

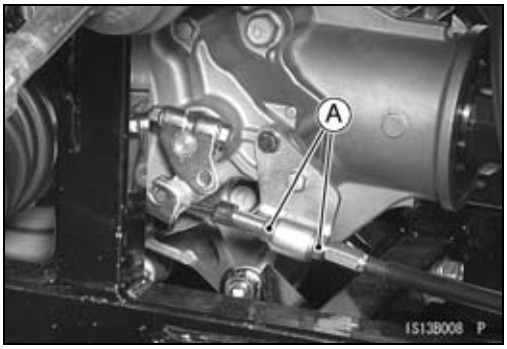
○The differential shift lever travel should be about 5 notches (clicks).

Differential Shift Lever Travel

Standard:	**about 5 notches (clicks) at 98 N (10 kgf, 22 lbf)**

★If the lever travel is more than 9 notches (clicks) at 98 N (10 kgf, 22 lbf), adjust the cable.

Differential Shift Lever Play Adjustment



- Loosen the differential shift cable locknuts [A] at the front final gear case.
- Turn the nuts to obtain the correct amount of travel.
- Tighten:

Torque - Differential Shift Cable Locknuts: 9.8 N·m (1.0 kgf·m, 87 in·lb)

Front Final Gear Case Oil Change

- Warm up the oil by running the vehicle so that the oil will pick up any sediment and drain easily. Then stop the vehicle.
- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Place an oil pan beneath the front final gear case and remove the oil drain plug [A].

⚠ WARNING

Oil on tires can cause loss of traction and an accident resulting in serious injury or death. When draining or filling the final gear case, do not spill oil the tire or rim. Clean any oil that may spill with a high-flash point solvent.

- After the oil has completely drained out, install the oil drain plug with a new O-ring.

○Apply grease to the O-ring.

- Tighten:

Torque - Front Final Gear Case Oil Drain Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)

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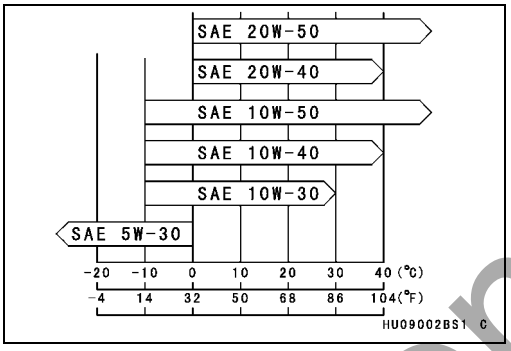
Periodic Maintenance Procedures

● Fill the gear case up to the bottom of filler opening with the oil specified below.



Front Final Gear Case Oil

Type: **API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2**

Viscosity: **SAE 10W-40**

Capacity: **0.7 L (0.74 US qt)**

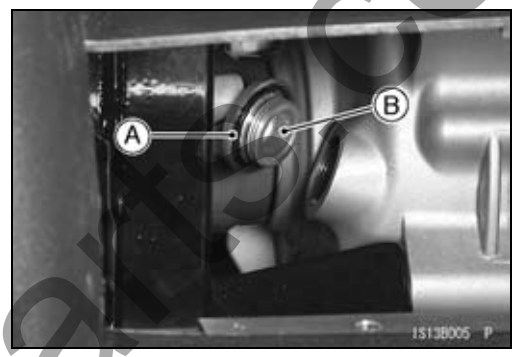
NOTE

○*Depending on the atmospheric temperature of your riding area, the engine oil viscosity should be changed according to the chart.*

● Be sure the O-ring [A] is in place, and tighten the filler cap [B].

○Apply grease to the O-ring.

Torque - Front Final Gear Case Oil Filler Cap: 29 N·m (3.0 kgf·m, 21 ft·lb)

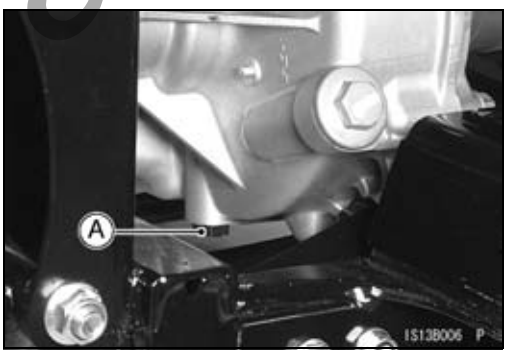


Rear Final Gear Case Oil Change

● Warm up the oil by running the vehicle so that the oil will pick up any sediment and drain easily. Then stop the vehicle.

● Park the vehicle so that it is level, both side-to-side and front-to-rear.

● Place an oil pan beneath the rear final gear case and remove the oil drain plug [A].



⚠ WARNING

Oil on tires can cause loss of traction and an accident resulting in serious injury or death. When draining or filling the final gear case, do not spill oil the tire or rim. Clean any oil that may spill with a high-flash point solvent.

● After the oil has completely drained out, install the oil drain plug with a new O-ring.

○Apply grease to the O-ring.

● Tighten:

Torque - Rear Final Gear Case Oil Drain Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)

● Fill the final gear case up to the bottom of filler opening with the oil specified below.

Rear Final Gear Case Oil

Type: **MOBIL FLUID 424, CITGO TRANSGARD TRACTOR HYDRAULIC FLUID or EXXON HYDRAUL 560**

Capacity: **1.0 L (1.06 US qt)**

○Do not use mixing the above oils.

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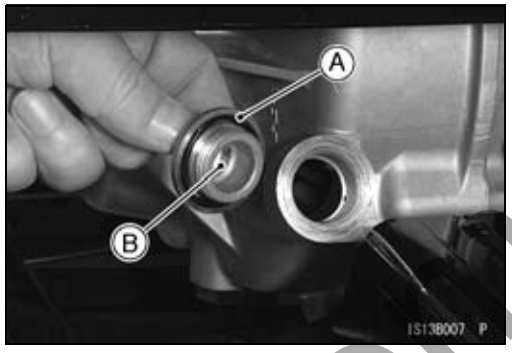
Periodic Maintenance Procedures

● Be sure the O-ring [A] is in place, and tighten the filler cap [B].

○Apply grease to the O-ring.

Torque - Rear Final Gear Case Oil Filler Cap: 29 N·m (3.0 kgf·m, 21 ft·lb)



Brakes

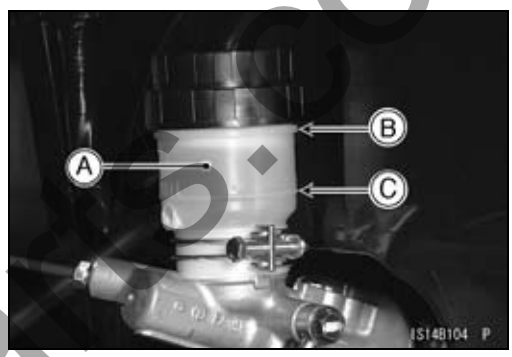
Brake Fluid Level Inspection

● With the vehicle on level ground, check that the fluid level in the reservoir [A] is between the upper and lower level lines.

Upper Level ine (MAX) [B]

Lower Level ine (MIN) [C]

★If the fluid level is lower than the lower level line, check for fluid leaks in the brake lines, and fill the reservoir to the upper level line.



⚠ WARNING

Mixing brands and types of brake fluid can reduce the brake system's effectiveness and cause an accident resulting in injury or death. Do not mix two brands of brake fluid. Change the brake fluid in the brake line completely if the brake fluid must be refilled but the type and brand of the brake fluid that is already in the reservoir are unidentified.

● Apply the brake forcefully for a few seconds and check for fluid leakage around the fittings.

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

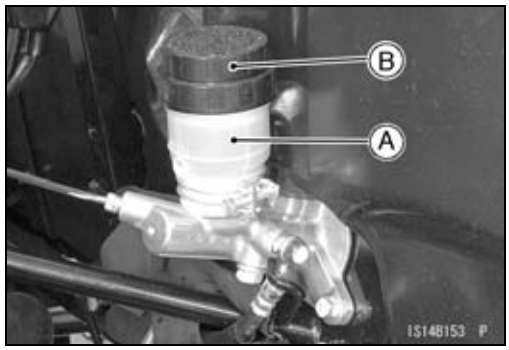
Brake Fluid Change

● Level the brake fluid reservoir [A].

NOTE

○*The fluid level must be checked several times during the fluid changing and replenished as necessary. If the fluid in the reservoir runs completely out any time during fluid changing, air bleeding must be done since air will have entered the line.*

● Remove the reservoir cap [B].



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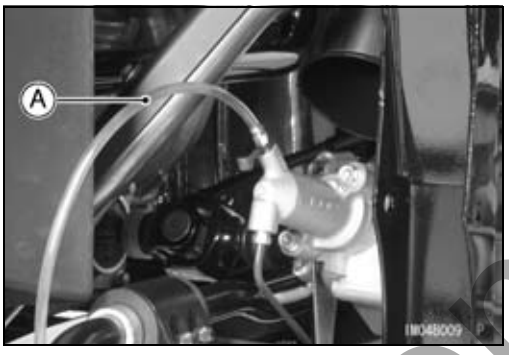
Periodic Maintenance Procedures

- Remove the rubber cap from the bleed valve on the rear master cylinder.
- Connect a clear plastic hose [A] to the bleed valve, run the other end of the hose into a container.



NOTE

○*Start with the rear master cylinder and finish with the front left or right caliper.*

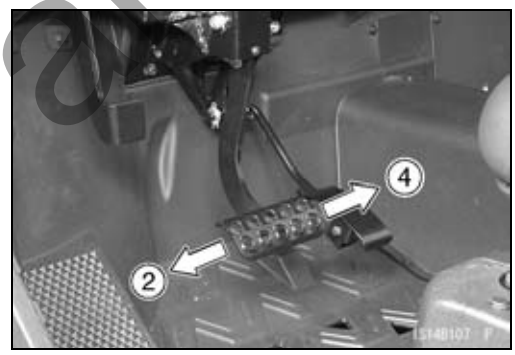
- Fill the reservoir with new brake fluid.
- Change the brake fluid as follows:

1. Open bleed valve.
2. Pump brake pedal and hold it.
3. Close bleed valve.
4. Release brake pedal.

- Repeat the previous step until fresh brake fluid comes out into the plastic hose or the color of the fluid changes.
- Remove the clear plastic hose.
- Tighten:

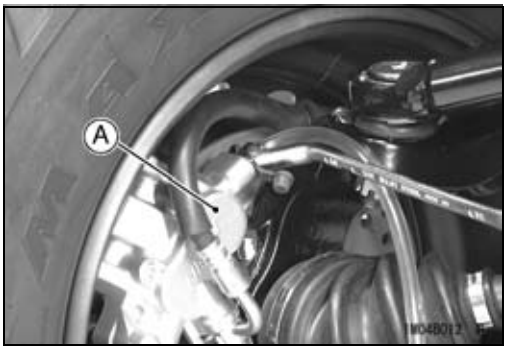
Torque - Rear Master Cylinder Bleed Valve: 5.4 N·m (0.55 kgf·m, 48 in·lb)

- Install the rubber cap on the bleed valve.



- Repeat the previous step for front calipers [A].
- After changing the fluid, tighten the caliper bleed valves.

Torque - Caliper Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)



- When brake fluid changing is finished, add the fluid to the upper level in the reservoir.
- Tighten:

Torque - Front Master Cylinder Reservoir Cap: 3.4 N·m (0.35 kgf·m, 30 in·lb)

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Periodic Maintenance Procedures

- After changing the fluid, check the brake for good braking power, no brake drag, and no fluid leakage.

★If necessary, bleed the air from the brake lines (see Blake Line Air Bleeding in the Brakes chapter).

⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake pedal has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

Brake Pedal Play Inspection

- Check the brake pedal play [A].

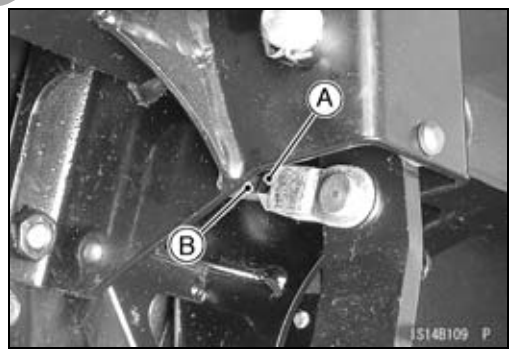
Brake Pedal Play
Standard: 2 ~ 10 mm (0.08 ~ 0.39 in.)

★If the play is not correct, adjust it.

- Loosen the locknut [A] and turn the push rod [B] to obtain the correct amount of free play.
- Tighten:

Torque - Push Rod Locknut: 17.2 N·m (1.8 kgf·m, 13 ft·lb)

- Check the brake for good braking power and no brake drag.



⚠ WARNING

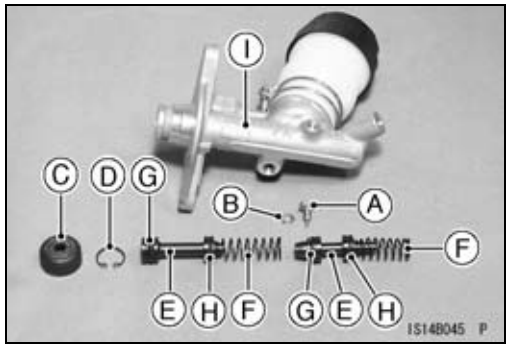
Insufficient free play can cause brake heating and drag, resulting in skidding and loss of control which could cause an accident resulting in serious injury or death. Be sure the brake free play is adjusted to the specification.

Brake Master Cylinder Cup and Dust Seal Replacement

- Remove the front master cylinder (see Front Master Cylinder Removal in the Brakes chapter).
- Remove the piston stop bolt [A] and washer [B].
- Remove the dust seal [C] and then the retainer [D] with the circlip pliers.

Special Tool - Inside Circlip Pliers: 57001-143

○Remove the piston assembly (two pistons) by lightly tap the master cylinder on a wooden block.
Pistons [E]
Springs [F]
Secondary Cups [G]
Primary Cups [H]
Master Cylinder [I]



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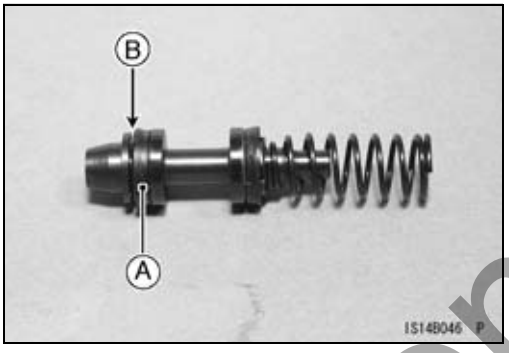
Periodic Maintenance Procedures

○Be careful of the secondary cup [A] direction [B].



● Assemble the master cylinder:
○Clean all the parts including the master cylinder with brake fluid or alcohol, and apply brake fluid to the removed parts and the inner wall of the cylinder.

NOTICE

Use only brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the brake.

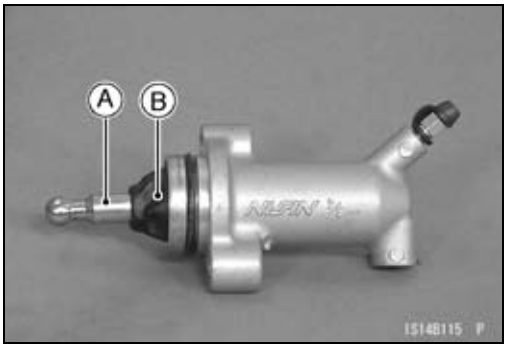
○Push the piston assembly in all the way with a screwdriver and install the piston stop bolt. Use a new aluminum washer.
○Tighten:

Torque - Piston Stop Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Reservoir Clamp Bolt: 6.2 N·m (0.63 kgf·m, 55 in·lb)

● Install the front master cylinder (see Front Master Cylinder Installation in the Brakes chapter).

Rear Brake Master Cylinder Cup, O-ring and Boot Replace

● Remove:
Rear Brake Master Cylinder (see Rear Brake Master Cylinder Removal in the Brakes chapter)
Push Rod [A]
Boot [B]



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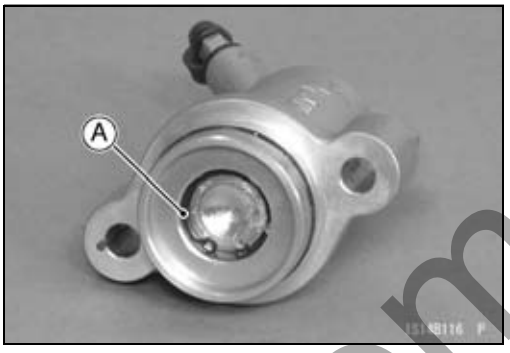
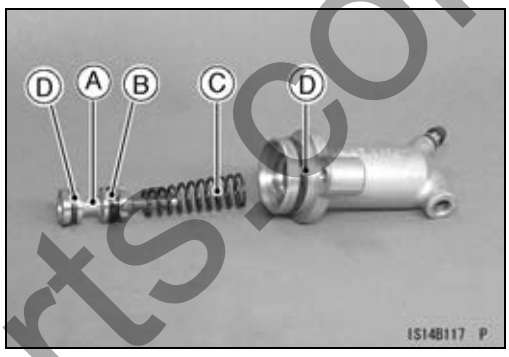
Periodic Maintenance Procedures

● Remove:
Circlip [A]

Special Tool - Inside Circlip Pliers: 57001-143



● Remove:
Piston [A]
Cup [B]
Spring [C]
O-rings [D]

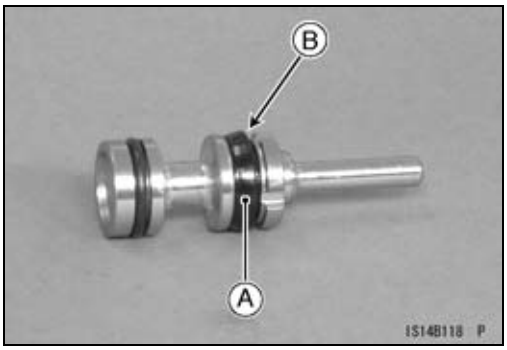


● Assemble the master cylinder.
● Clean all the parts including the master cylinder with brake fluid or alcohol, and apply brake fluid to the removed parts and the inner wall of the cylinder.

NOTICE

Use only brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, motor oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely, and will eventually deteriorate the rubber used in the brake.

● Be careful of the cup [A] direction [B].



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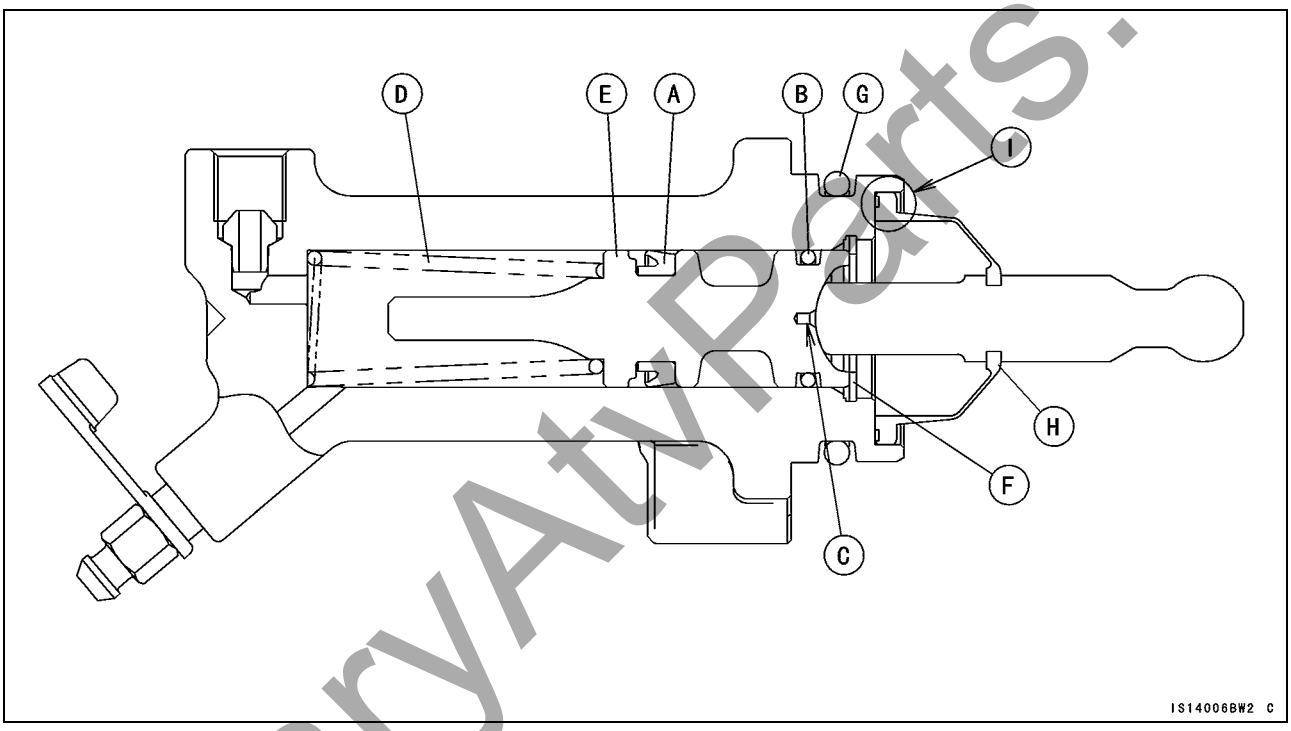
Periodic Maintenance Procedures

- Apply silicone grease:
  New Cup [A]
  New O-ring [B]
  Push Rod End [C]
- Install:
  Spring [D] (as shown in the figure)
  Piston [E]
  New Cup and O-ring
  New Circlip [F]

Special Tool - Inside Circlip Pliers: 57001-143

- Install:
  New O-ring [G]
  Push Rod
  New Boot [H]

○Do not apply oil or grease to the seal part [I] of the boot.



- Install the rear master cylinder (see Rear Brake Master Cylinder Installation in the Brakes chapter).

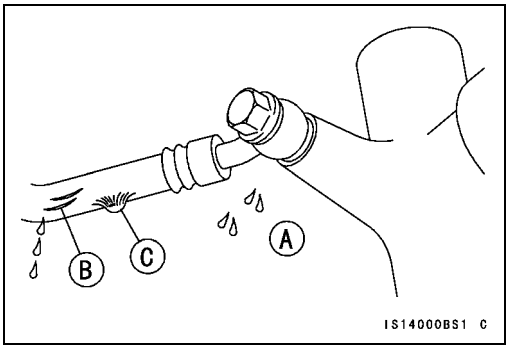
Brake Hose and Pipe Inspection

- The high pressure inside the brake line can cause fluid to leak [A] or the hose to burst if the line is not properly maintained. Bend and twist the rubber hose while examining it.

★Replace it if any cracks [B] or bulges [C] are noticed.

- The metal pipe will rust if the plating is damaged.

★Replace the pipe if it is rusted, cracked (especially check the fittings), or if the plating is badly scratched.



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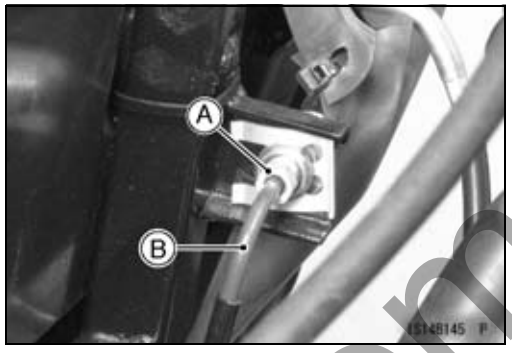
Periodic Maintenance Procedures

Brake Hose Replacement

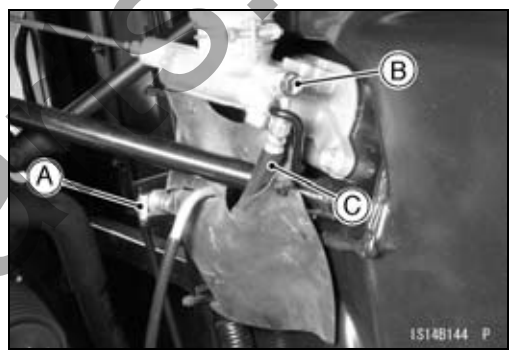
- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Lift and hold the front fender rear (see Front Fender Rear Removal in the Frame chapter).
- Drain the brake fluid.
- Remove:
  Front Wheels (see Wheel Removal in the Wheels/Tires chapter)
- Unscrew the nipple [A] and remove the brake pipe [B].
- Immediately wipe up any brake fluid that spills.



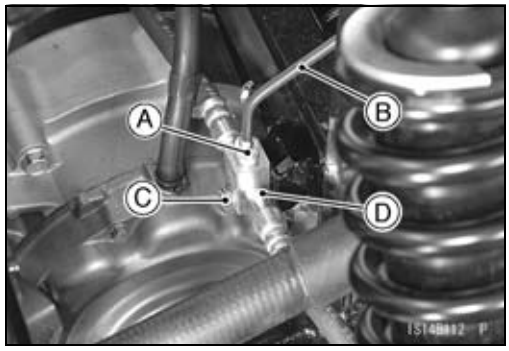
NOTICE

Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely wiped up immediately.

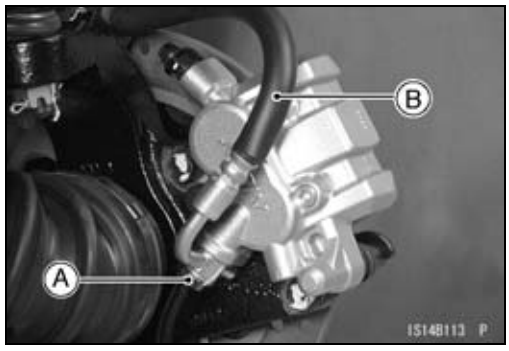
- Remove:
  Retainer [A]
  Banjo Bolt [B], Washers and Brake Hose [C]



- Remove:
  Nipple [A] (unscrew)
  Brake Pipe [B]
  Bolt [C]
  Joint [D]



- Remove:
  Banjo Bolt [A], Washers and Brake Hose [B]



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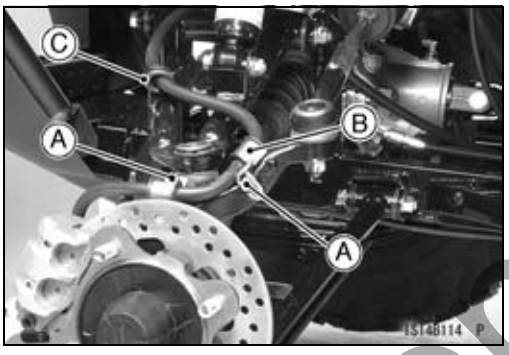
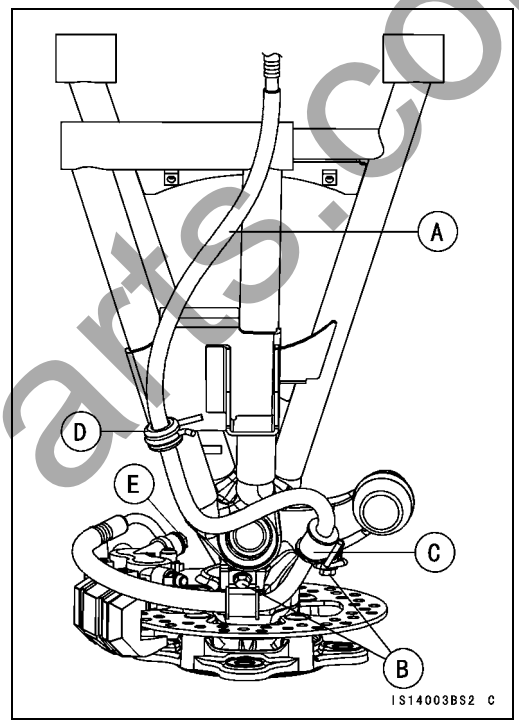
Periodic Maintenance Procedures

● Remove:
Clamp Bolts [A] and Clamp [B] (both sides)
Grommets [C] (both sides)



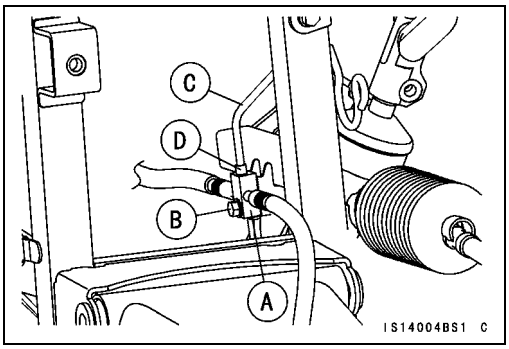
● Install:
New Brake Hose [A]
Clamp Bolts [B] and Clamp [C] (both sides)
Grommets [D] (both sides)
Banjo Bolts [E] and New Washers
● Touch the stopper of the brake hose to the stopper on the calliper.
● Tighten:

Torque - Brake Hose Banjo Bolts: 23.5 N·m (2.4 kgf·m, 17 ft·lb)



● Install:
Joint [A]
Bolt [B]
Brake Pipe [C]
Nipple [D]
● Tighten:

Torque - Brake Pipe Nipple: 17.5 N·m (1.8 kgf·m, 13 ft·lb)



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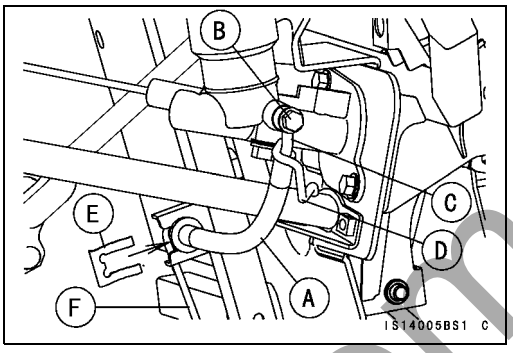
Periodic Maintenance Procedures



● Install:
New Brake Hose [A]
Banjo Bolts [B] and New Washers
○Touch the brake hose clasp [C] to the stopper [D].
● Tighten:

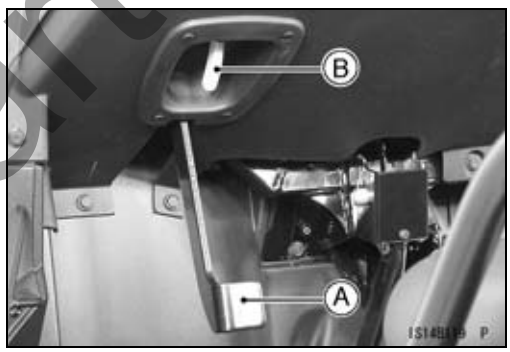
Torque - Brake Hose Banjo Bolts: 23.5 N·m (2.4 kgf·m, 17 ft·lb)

● Install:
Retainer [E]
Brake Pipe [F]
Nipple
● Tighten:

Torque - Brake Pipe Nipple: 17.5 N·m (1.8 kgf·m, 13 ft·lb)

● Fill the reservoir with new brake fluid (see Brake Fluid Change).
● Check that the brake line has proper fluid pressure and no fluid leakage.
● Install the removed parts.

Parking Brake Pedal Inspection

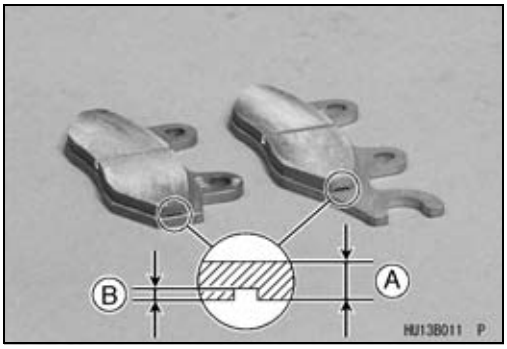


● Push down the parking brake pedal [A] until it is stopped.
○The vehicle should not roll while parked.
● Pull the parking release lever [B] above and return the pedal to its rest position.
★If the pedal does not work correctly, adjust it (see Parking Brake Cable Installation in the Brakes chapter).

⚠ WARNING

Insufficient free play can cause brake heating and drag, resulting in skidding and loss of control which could cause an accident resulting in serious injury or death. Be sure the brake free play is adjusted to the specification.

Front Brake Pad Wear Inspection



● Check the lining thickness [A] of the pads in each caliper.
★If the lining thickness of either pad is less than the service limit [B], replace both pads in the caliper as a set.

Pad Lining Thickness
Standard: 3.9 mm (0.15 in.)
Service Limit: 1 mm (0.04 in.)

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Periodic Maintenance Procedures

Front Brake Caliper Piston Seal and Dust Seal Replacement

● Remove:
Caliper (see Front Brake Caliper Removal in the Brakes chapter)
Pads (see Brake Pad Removal in the Brakes chapter)
Anti-rattle Spring

● Using compressed air, remove the piston.
○Cover the caliper opening with a clean, heavy cloth [A].
○Remove the piston by lightly applying compressed air [B] to where the brake line fits into the caliper.

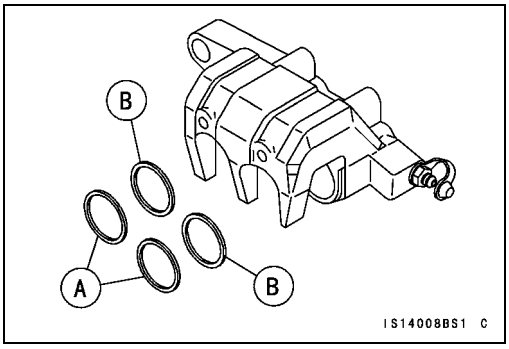
⚠ WARNING

The piston in the brake caliper can crush hands and fingers. Never place your hand or fingers in front of the piston.

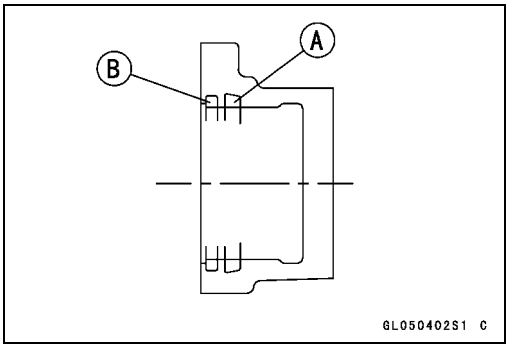
NOTE

○*If compressed air is not available, do as follows with the brake hose connected to the caliper.*
○*Prepare a container for brake fluid.*
○*Remove the pads (see Brake Pad Removal) and anti-rattle spring.*
○*Pump the brake pedal to remove the caliper piston.*

● Remove:
Dust Seals [A]
Piston Seals [B]



● Replace the piston seal [A] with a new one.
○Apply silicone grease to the piston seal, and install it into the cylinder by hand.
● Replace the dust seal [B] with a new one.
○Apply brake fluid to the dust seal, and install it into the cylinder by hand.



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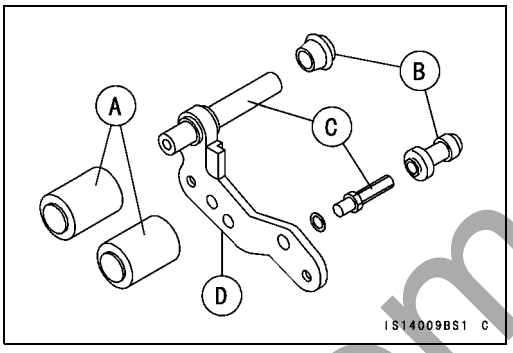
Periodic Maintenance Procedures



- Apply brake fluid to the outside of the pistons [A] and inside of the cylinder
- Push the seals into the cylinder by hand. Take care that neither the cylinder nor the piston skirt gets scratched.
- Replace the rubber boots [B] if they are damaged.
- Apply a thin coat of silicone grease to the caliper holder shafts [C] (Silicone grease is a special high temperature, water-resistant grease).
- Install:
  Caliper Holder [D]

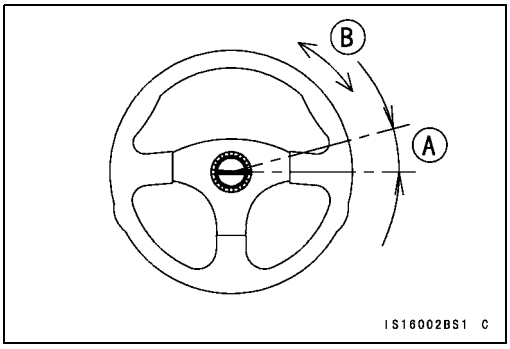
- Install the anti-rattle spring [A] in the caliper as shown.
- Install the pads (see Brake Pad Installation in the Brakes chapter).

Rear Brake Plates Replacement

- Replace the steel plates and friction plates in accordance with the specified interval (see Rear Final Gear Case section in the Final Drive chapter).

Steering

Steering Inspection



- Check steering wheel free play [A].

○Set the front wheels straight ahead. Gently turn [B] the steering wheel left and right. The steering wheel free play is the amount of travel in the steering wheel, before the front wheels begin to turn.

Steering Wheel Free Play
Standard: 0 ~ 20 mm (0 ~ 0.79 in.)

★If steering wheel free play is not correct, inspect the following:
Steering Wheel Mounting Nut (see Steering Wheel Centering in the Steering chapter)
Intermediate Shaft Clamp Bolts (see Steering Shaft Installation in the Steering chapter)
Steering Gear Assembly Bracket Bolts (see Steering Gear Assembly Installation in the Steering chapter)
Steering Gear Assembly Mounting Rubber Dampers
Tie-rod End Nuts (see Steering Gear Assembly Installation in the Steering chapter)

★If the inspections above are good but the free play is out of the specified, the steering gear assembly is damaged and should be replaced as a unit.

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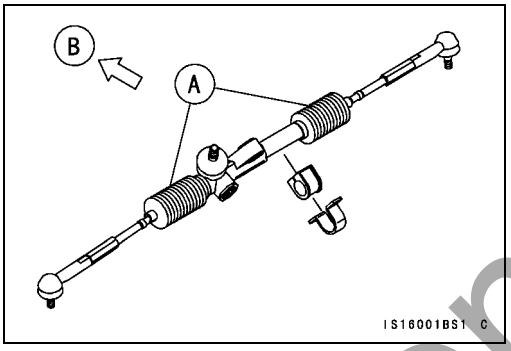
Periodic Maintenance Procedures

Steering Joint Dust Boot Inspection



- Visually inspect the dust boots [A] at both the ends of the steering gear assembly.
  Front [B]

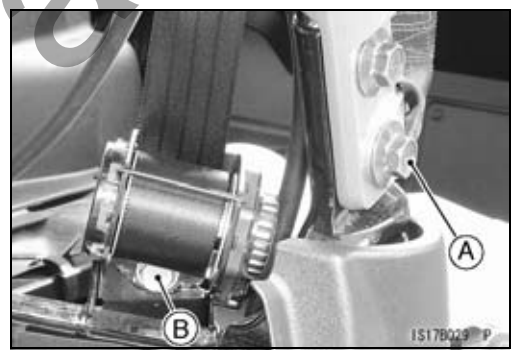
★If there is any signs of deterioration, cracks, or damage, replace the steering gear assembly together with these boots.

Frame

Seat Belt Inspection

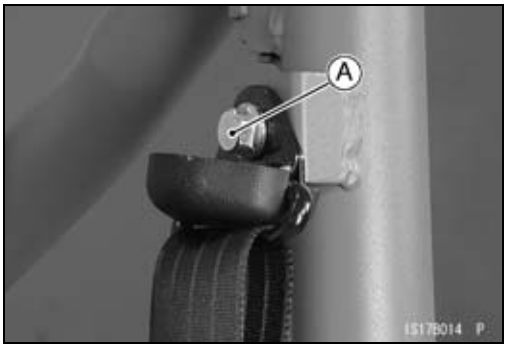
- Check the belt [A] for damage or tear.

★If necessary, replace the belt with a new one.



○Check the tightness torque of the seat belt mounting bolts. (both sides)

Torque - Right and Left Bar Mounting Bolts [A]: 98 N·m (10 kgf·m, 72 ft·lb)
Seat Belt Case Mounting Nuts [B]: 46.5 N·m (4.7 kgf·m, 34 ft·lb)



Torque - Seat Belt Mounting Bolt [A]: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

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Periodic Maintenance Procedures

Torque - Seat Belt Buckle Mounting Bolts [A]: 46.5 N·m (4.7 kgf·m, 34 ft·lb)

- Check the operation of the buckle [A].

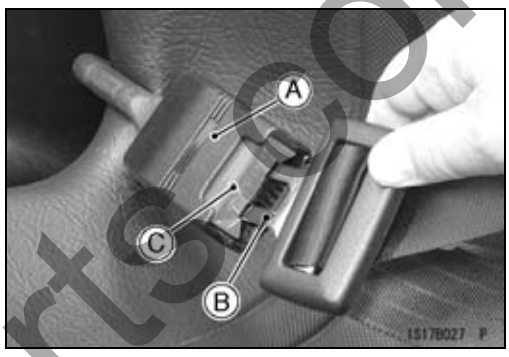
○Set the plate [B] in the buckle, and confirm the plate does not come off when pulling it.

○Set the plate in the buckle, and confirm the plate comes off when the buckle button [C] is pushed.

★If operation is not correct, visually inspect the plate.

★If the plate is damaged, replace the plate assembly with a new one.

★If the plate is not damaged, replace the buckle assembly.



Electrical System

Spark Plug Cleaning/Inspection

- Remove the spark plug (see Spark Plug Removal in the Electrical System chapter).
- Clean the spark plug, preferably in a sandblasting device, and then clean off any abrasive particles. The plug may also be cleaned using a wire brush or other suitable tool.

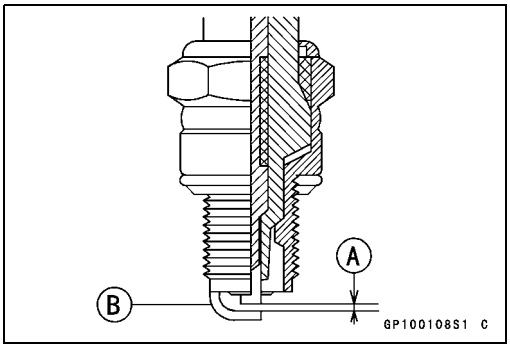
★If the spark plug electrodes are corroded or damaged, or if the insulator is cracked, replace the plug. Use the standard spark plug or its equivalent.

Spark Plug Gap Inspection

- Measure the gap [A] with a wire-type thickness gauge.

★If the gap is incorrect, carefully bend the side electrode [B] with a suitable tool to obtain the correct gap.

Spark Plug Gap
0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)

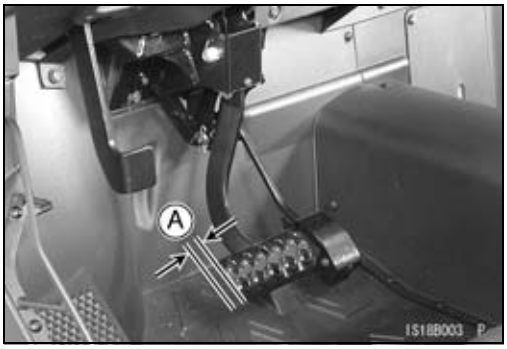


Brake Light Switch Inspection

- Turn on the ignition switch.
- Check the operation of the rear brake light switch by depressing the brake pedal.

★If it does not as specified, adjust the brake light timing.

Brake Light Timing
Standard: On after about 10 mm (0.4 in.) of pedal travel [A]



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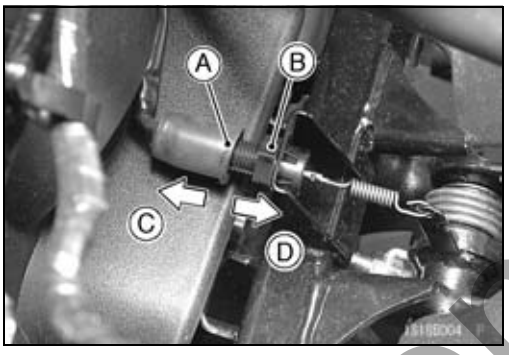
Periodic Maintenance Procedures

Brake Light Timing Adjustment



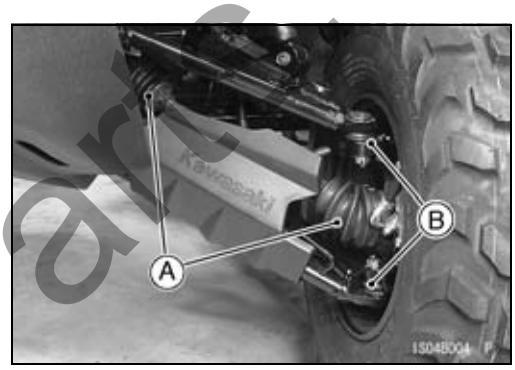
- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Lift and hold the front fender rear (see Front Fender Rear Removal in the Frame chapter).
- Adjust the brake light switch [A] up or down. To change the switch position, turn the adjusting nut [B].
  Light sooner [C]
  Light later [D]

NOTICE

To avoid damaging the electrical connections inside the switch, be sure that the switch body does not turn during adjustment.

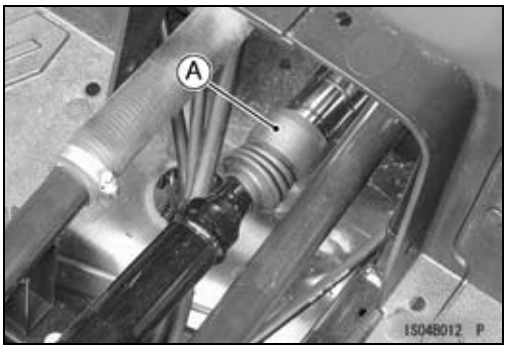
Joint Boots Inspection

Front Axle/Steering Knuckle Joint Boots Inspection



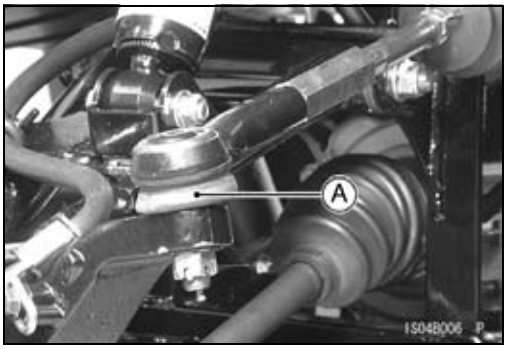
- Visually inspect the front axle joint boots [A].
★If the joint boot is torn, worn, deteriorated, or leaks grease, replace the joint boot or front axle assembly (see Front Axle Joint Boot Replacement in the Final Drive chapter).
- Visually inspect the knuckle joint boots [B].
★If the joint boot is torn, worn, deteriorated, or leaks grease, replace the knuckle (see Steering Knuckle section in the Steering chapter).

Front Propeller Shaft Joint Boots Inspection



- Remove:
  Center Cover (see Center Cover Removal in the Frame chapter)
- Visually inspect the boot [A] of the front propeller shaft.
★If damage, tear or deterioration is found, replace the boots (see Front Propeller Shaft section in the Final Drive chapter).

Tie-rod End Boots Inspection



- Visually inspect the tie-rod end boots [A] of the tie-rods.
★If the boot is torn, worn, deteriorated, or leaks grease, replace the tie-rod end (see Tie-Rod End Removal in the Steering chapter).

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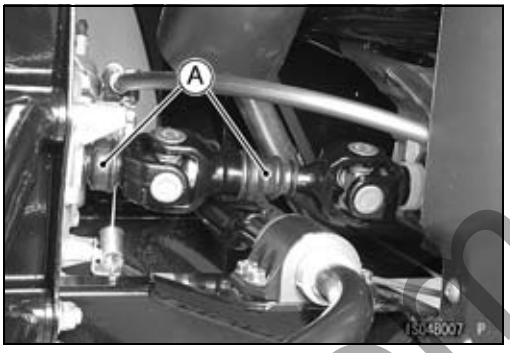
Periodic Maintenance Procedures

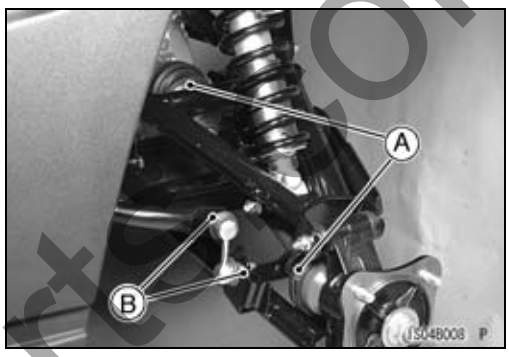
Rear Propeller Shaft Joint Boots Inspection



- Visually inspect the boots [A] of the rear propeller shaft.

★If the joint boot is torn, worn, or deteriorated, replace the joint boot and check the propeller shaft (see Rear Propeller Shaft section in the Final Drive chapter).

Rear Axle/Stabilizer Joint Boots Inspection



- Visually inspect the rear axle joint boots [A].

★If the joint boot is torn, worn, deteriorated, or leaks grease, replace the joint boot or rear axle assembly (see Rear Axle Joint Boot Replacement in the Final Drive chapter).

- Visually inspect the stabilizer joint boots [B].

★If the joint boot is torn, worn, deteriorated, or leaks grease, replace the stabilizer joint (see Stabilizer Removal in the Suspension chapter).

General Lubrication

Lubrication

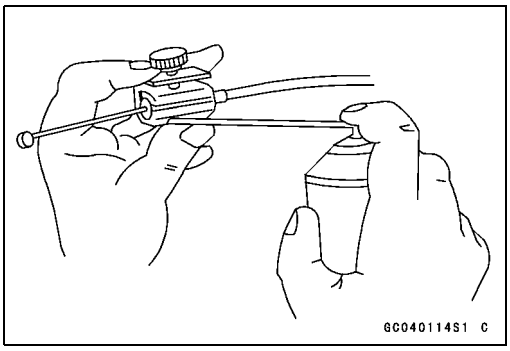
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

Cables: Lubricate with Cable Lubricant

Rear Brake Inner Cable
Throttle Inner Cable
Variable Differential Shift Inner Cable
2WD/4WD Shift Inner Cable



- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a pressure cable luber with an aerosol cable lubricant.

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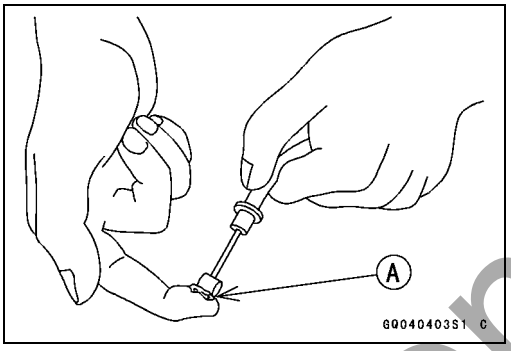
Periodic Maintenance Procedures

Points: Lubricate with Grease.
Throttle Inner Cable Ends [A]
Brake Cable Upper End
Variable Differential Control Cable Ends
2WD/4WD Shift Cable Ends



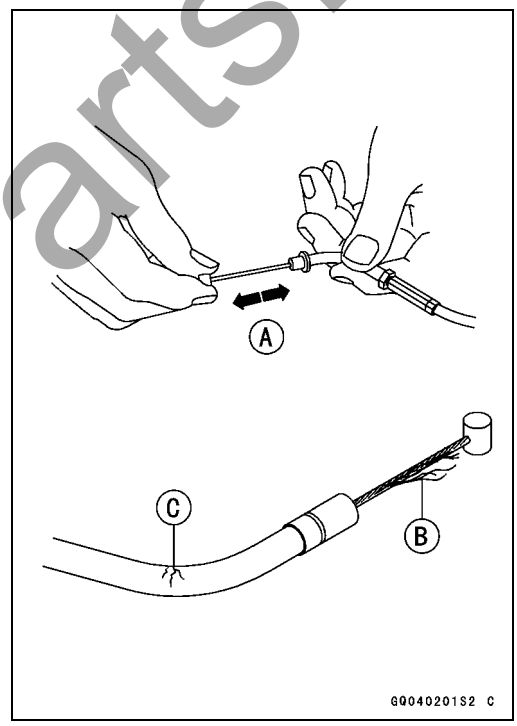
Slide Points: Lubricate with Grease.
Brake Lever
Brake Pedal Pivot Shaft
Throttle Pedal Pivot Shaft

Cables

Inspection

- With the cable disconnected at the both ends, the cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



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Periodic Maintenance Procedures

Bolts and Nuts Tightening

Tightness Inspection

- Check the tightness of the bolts and nuts listed here in accordance with the Periodic Maintenance Chart. Also, check to see that each cotter pin is in place and in good condition.

★If there are loose fasteners, retorque them to the specified torque following the specified tightening sequence. Refer to the appropriate chapter for torque specifications. If torque specifications are not listed in the appropriate chapter, see the Basic Torque Table (see Torque and Locking Agent). For each fastener, first loosen it by 1/2 turn, then tighten it.

★If cotter pins are damaged, replace them with new ones.

Bolts, Nuts, and Fasteners to be checked

Engine:
Engine Mounting Bolts
Engine Bracket Pipe Mounting Bolts
Exhaust Pipe Nuts
Muffler Mounting Bolts
Muffler Clamp Bolt
Spark Arrester Mounting Bolts
Throttle Pedal Pivot Clip
Fuel Tank Band Bolts

Transmission/Final Drive:
Shift Lever Assembly Nut
Shift Shaft Lever Bolt
Tie-rod End Bolt and Nut
Tie-rod End Locknuts
Differential Shift Lever Pivot Clip
Final Gear Case Mounting Bolts
Final Gear Case Bracket Bolts

Wheels:
Axle Nuts and Cotter Pins
Wheel Nuts

Brakes:
Front Master Cylinder Mounting Bolts
Master Cylinder Push Rod Clevis Pin Clip
Rear Master Cylinder Mounting Bolts
Brake Pedal Pivot Shaft Cotter Pin
Brake Caliper Mounting Bolts
Parking Brake Lever Assembly Mounting Bolts

Suspension:
Stabilizer Holder Bolts
Suspension Arm Pivot Nuts
Shock Absorber Mounting Nuts

Steering:
Steering Wheel Mounting Nut
Intermediate Shaft Clamp Bolts
Main Shaft Mounting Bolts and Nuts
Tie-rod End Nuts and Cotter Pins
Tie-rod End Locknuts

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Periodic Maintenance Procedures

Frame:

Bars Mounting Bolts and Nuts
Front Guard Mounting Nuts
Cargo Bed Mounting Pin Clips
Seat Belt Mounting Bolts
Battery Holder Nuts

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Fuel System (DFI)

Table of Contents

Exploded View 3-4
DFI System 3-8
DFI Parts Location 3-13
Specifications 3-15
Special Tools and Sealant 3-17
DFI Servicing Precautions 3-19
  DFI Servicing Precautions 3-19
Troubleshooting the DFI System 3-21
  Outline 3-21
  Inquiries to Rider 3-24
DFI System Troubleshooting Guide 3-27
Self-Diagnosis 3-31
  Self-diagnosis Outline 3-31
  Self-diagnosis Procedures 3-31
  How to Read Service Codes 3-34
  Service Code Erasing 3-34
  Service Code Table 3-34
  Backups 3-36
Throttle Sensor (Service Code 11) 3-38
  Throttle Sensor Removal/Adjustment 3-38
  Throttle Sensor Input Voltage Inspection 3-38
  Throttle Sensor Output Voltage Inspection 3-39
  Throttle Sensor Resistance Inspection 3-40
Inlet Air Pressure Sensor (Service Code 12) 3-41
  Inlet Air Pressure Sensor Removal 3-41
  Inlet Air Pressure Sensor Installation 3-41
  Inlet Air Pressure Sensor Input Voltage Inspection 3-41
  Inlet Air Pressure Sensor Output Voltage Inspection 3-42
Inlet Air Temperature Sensor (Service Code 13) 3-47
  Inlet Air Temperature Sensor Removal/Installation 3-47
  Inlet Air Temperature Sensor Output Voltage Inspection 3-47
  Inlet Air Temperature Sensor Resistance Inspection 3-48
Water Temperature Sensor (Service Code 14) 3-50
  Water Temperature Sensor Removal 3-50
  Water Temperature Sensor Installation 3-50
  Water Temperature Sensor Output Voltage Inspection 3-51
  Water Temperature Sensor Resistance Inspection 3-52
Crankshaft Sensor (Service Code 21) 3-53
  Crankshaft Sensor Removal/Installation 3-53
  Crankshaft Sensor Inspection 3-53
Speed Sensor (Service Code 24) 3-54
  Speed Sensor Removal 3-54
  Speed Sensor Installation 3-54
  Speed Sensor Input Voltage Inspection 3-54
  Speed Sensor Output Voltage Inspection 3-54
Vehicle-down Sensor (Service Code 31) 3-56
  Vehicle-down Sensor Removal 3-56
  Vehicle-down Sensor Installation 3-56
  Vehicle-down Sensor Input Voltage Inspection 3-56
  Vehicle-down Sensor Output Voltage Inspection 3-57

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Fuel Pump Relay (Service Code 46) 3-59
Fuel Pump Relay Removal 3-59
Fuel Pump Relay Inspection 3-59
Ignition Coils (#1, #2: Service Code 51, 52) 3-61
Ignition Coil Removal/Installation 3-61
Ignition Coil Winding Resistance 3-61
Ignition Coil Input Voltage Inspection 3-61
Fuel Injectors 3-63
Fuel Injector Removal 3-63
Fuel Injector Installation 3-63
Audible Inspection 3-65
Fuel Injector Resistance Inspection 3-65
Fuel Injector Power Source Voltage Inspection 3-65
Fuel Injector Output Voltage Inspection 3-66
Fuel Injector Fuel Line Inspection 3-67
FI Indicator Symbol (LCD) 3-69
FI Indicator Symbol (LCD) Inspection 3-69
ECU 3-70
ECU Removal 3-70
ECU Installation 3-70
ECU Power Supply Inspection 3-70
Fuel Line 3-73
Fuel Pressure Inspection 3-73
Fuel Flow Rate Inspection 3-74
Fuel Pump 3-76
Fuel Pump Removal 3-76
Fuel Pump Installation 3-76
Fuel Pump Operation Inspection 3-77
Fuel Pump Operating Voltage Inspection 3-77
Pressure Regulator Removal 3-78
Fuel Filter Cleaning 3-79
Throttle Pedal and Cable 3-80
Throttle Pedal Free Play Inspection 3-80
Throttle Pedal Free Play Adjustment 3-80
Throttle Pedal Position Adjustment 3-80
Throttle Pedal Removal 3-80
Throttle Pedal Installation 3-81
Throttle Cable Installation 3-81
Throttle Cable Lubrication and Inspection 3-82
Throttle Body Assy 3-83
Idle Speed Inspection 3-83
Idle Speed Adjustment 3-83
Throttle Body Assy Removal 3-83
Throttle Body Assy Installation 3-84
Throttle Body Assy Disassembly 3-85
Throttle Body Assy Assembly 3-86
Engine Vacuum Synchronization Inspection 3-86
Engine Vacuum Synchronization Adjustment 3-87
ISC Valve 3-88
ISC Valve Removal 3-88
ISC Valve Installation 3-88
ISC Valve Inspection 3-88
Air Cleaner 3-89
Air Cleaner Element Removal 3-89
Air Cleaner Element Installation 3-90
Air Cleaner Element Cleaning and Inspection 3-91
Air Cleaner Housing and Duct Removal 3-91

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Air Cleaner Housing and Duct Installaion 3-91
Fuel Tank and Fuel Hose..... 3-93
Fuel Tank Removal 3-93
Fuel Tank Installation 3-93
Fuel Tank Cleaning 3-95
Fuel Hose Inspection 3-95
Fuel Hose Replacement 3-95

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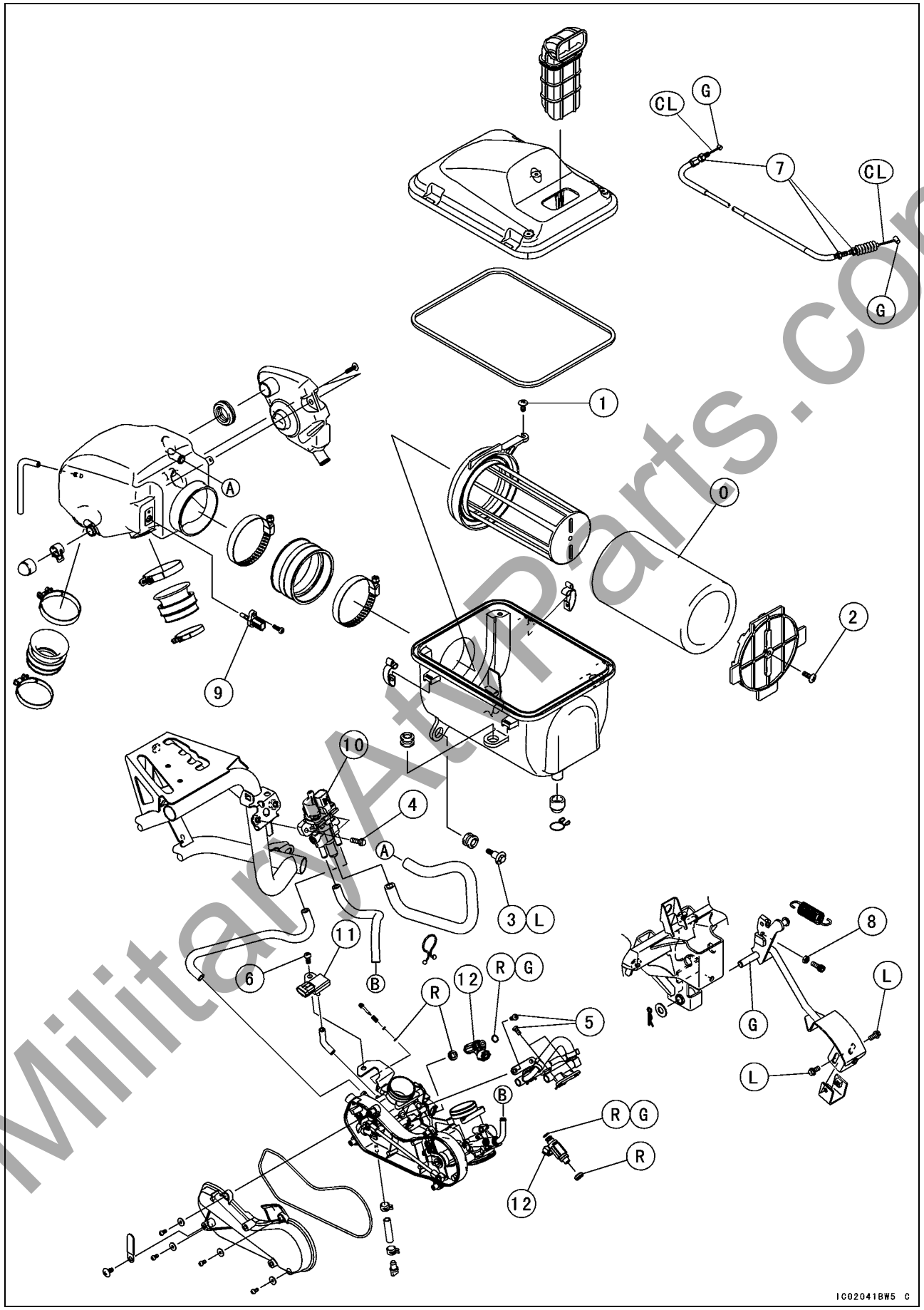
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Element Holder Screw	4.5	0.46	40 in·lb	
2	Element Cover Screw	4.5	0.46	40 in·lb	
3	Air Cleaner Mounting Bolts	8.8	0.90	78 in·lb	L
4	ISC Valve Mounting Bolts	8.8	0.90	78 in·lb	
5	Delivery Pipe Mounting Screws	5.0	0.51	44 in·lb	
6	Inlet Air Pressure Sensor Mounting Screw	5.0	0.51	44 in·lb	
7	Throttle Cable Locknuts	4.4	0.45	39 in·lb	
8	Throttle Pedal Position Bolt Locknut	10.8	1.1	96 in·lb	

9. Inlet Air Temperature Sensor
10. ISC Valve
11. Inlet Air Pressure Sensor
12. Fuel Injectors

CL: Apply cable lubricant.
G: Apply grease.
L: Apply a non-permanent locking agent.
O: Apply high-quality foam air filter oil.
R: Replacement Parts

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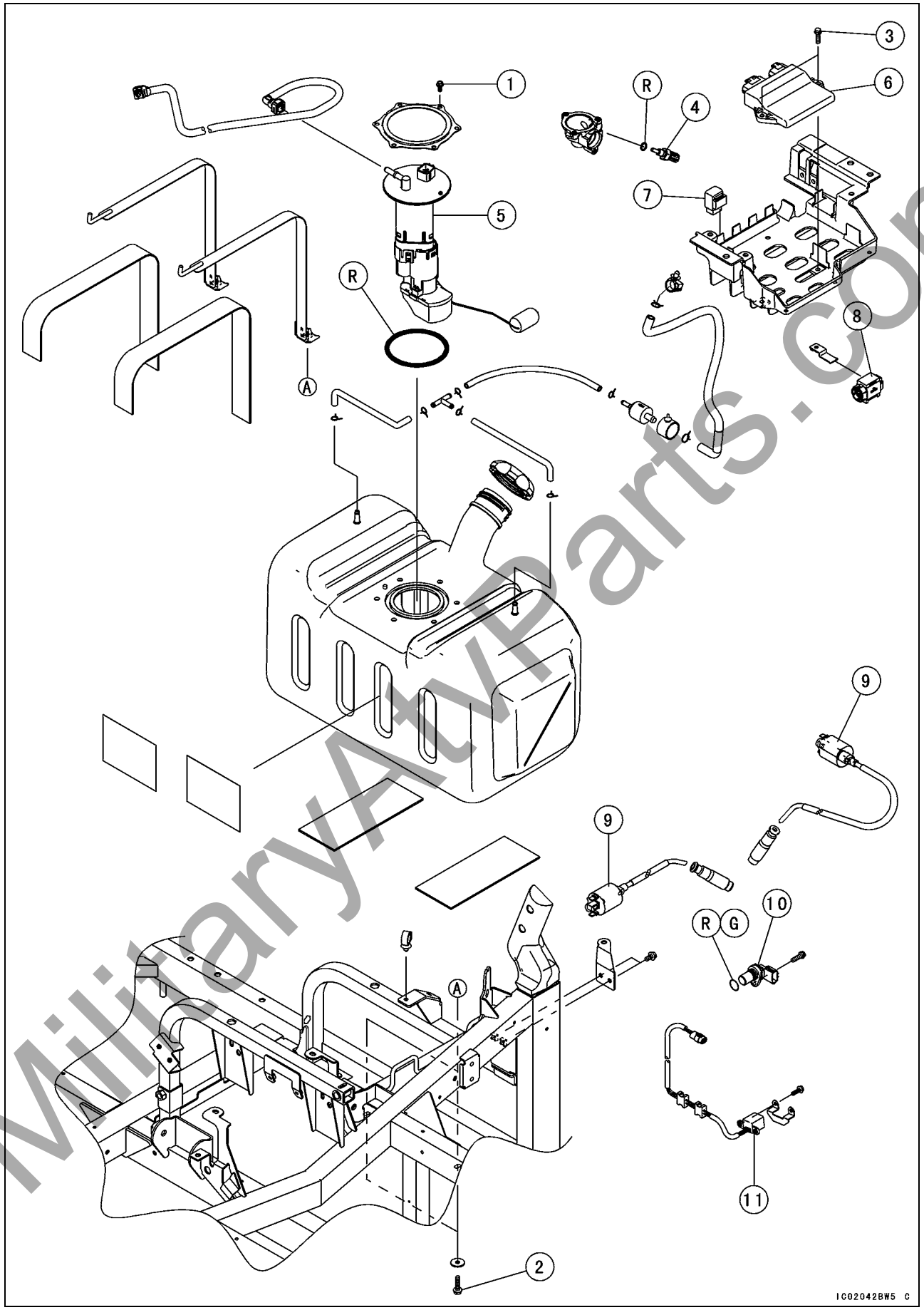
3-6 FUEL SYSTEM (DFI)

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Fuel Pump Mounting Bolts	4.0	0.41	35 in·lb	
2	Fuel Tank Band Bolts	11	1.1	97 in·lb	
3	ECU Mounting Bolts	6.9	0.70	61 in·lb	
4	Water Temperature Sensor	12	1.2	106 in·lb	

5. Fuel Pump
6. ECU (Electronic Control Unit)
7. Fuel Pump Relay
8. Vehicle-down Sensor
9. Ignition Coils
10. Speed Sensor
11. CrankShaft Sensor

G: Apply grease.
R: Replacement Parts

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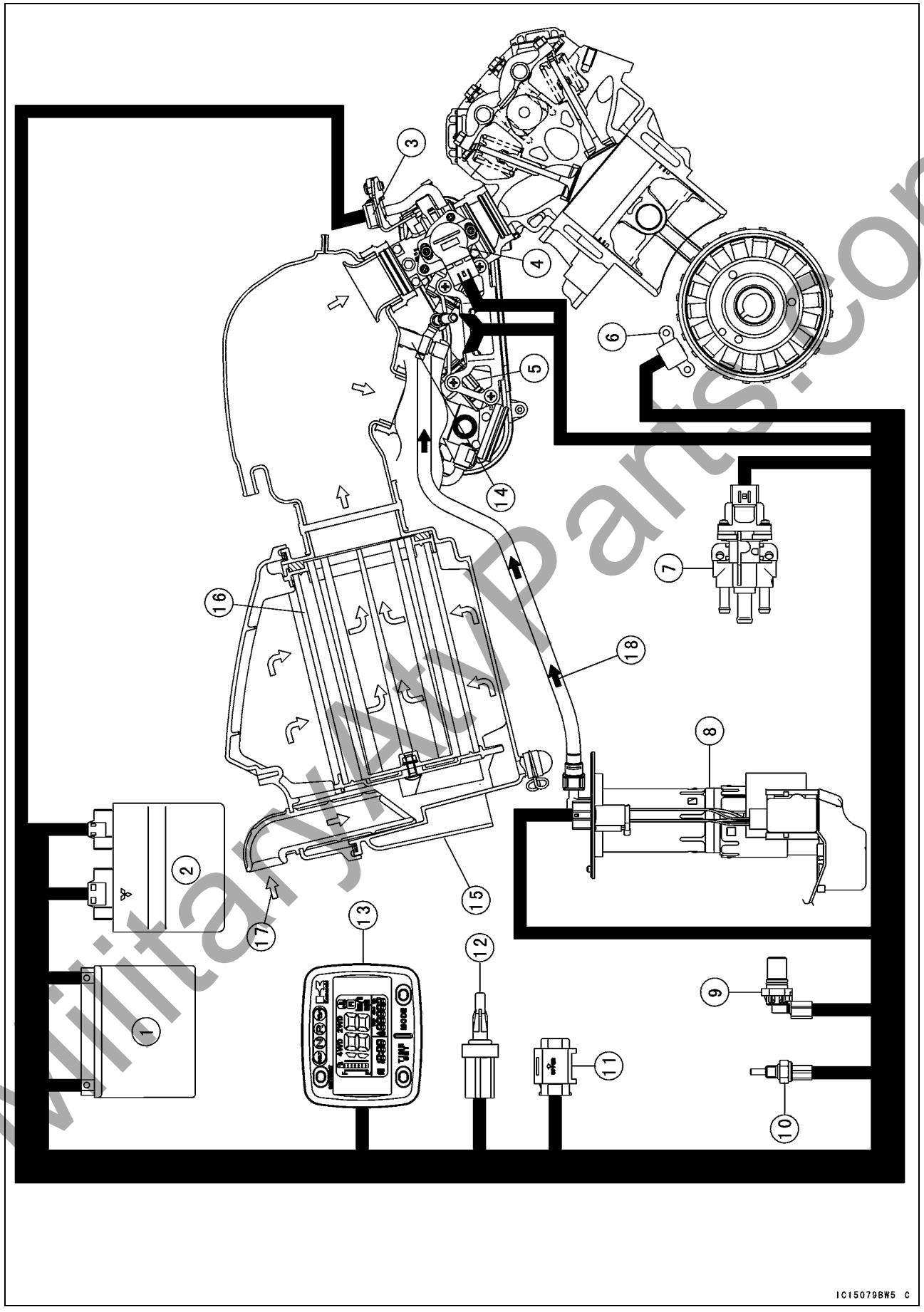
3-8 FUEL SYSTEM (DFI)

DFI System

DFI System



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DFI System

1. Battery
2. ECU (Electronic Control Unit)
3. Inlet Air Pressure Sensor
4. Throttle Sensor
5. Fuel Injectors
6. Crankshaft Sensor
7. ISC Valve
8. Fuel Pump
9. Speed Sensor
10. Water Temperature Sensor
11. Vehicle-down Sensor
12. Inlet Air Temperature Sensor
13. Multifunction Meter
14. Delivery Pipe
15. Air Cleaner Housing
16. Air Cleaner Element
17. Air Flow
18. Fuel Flow

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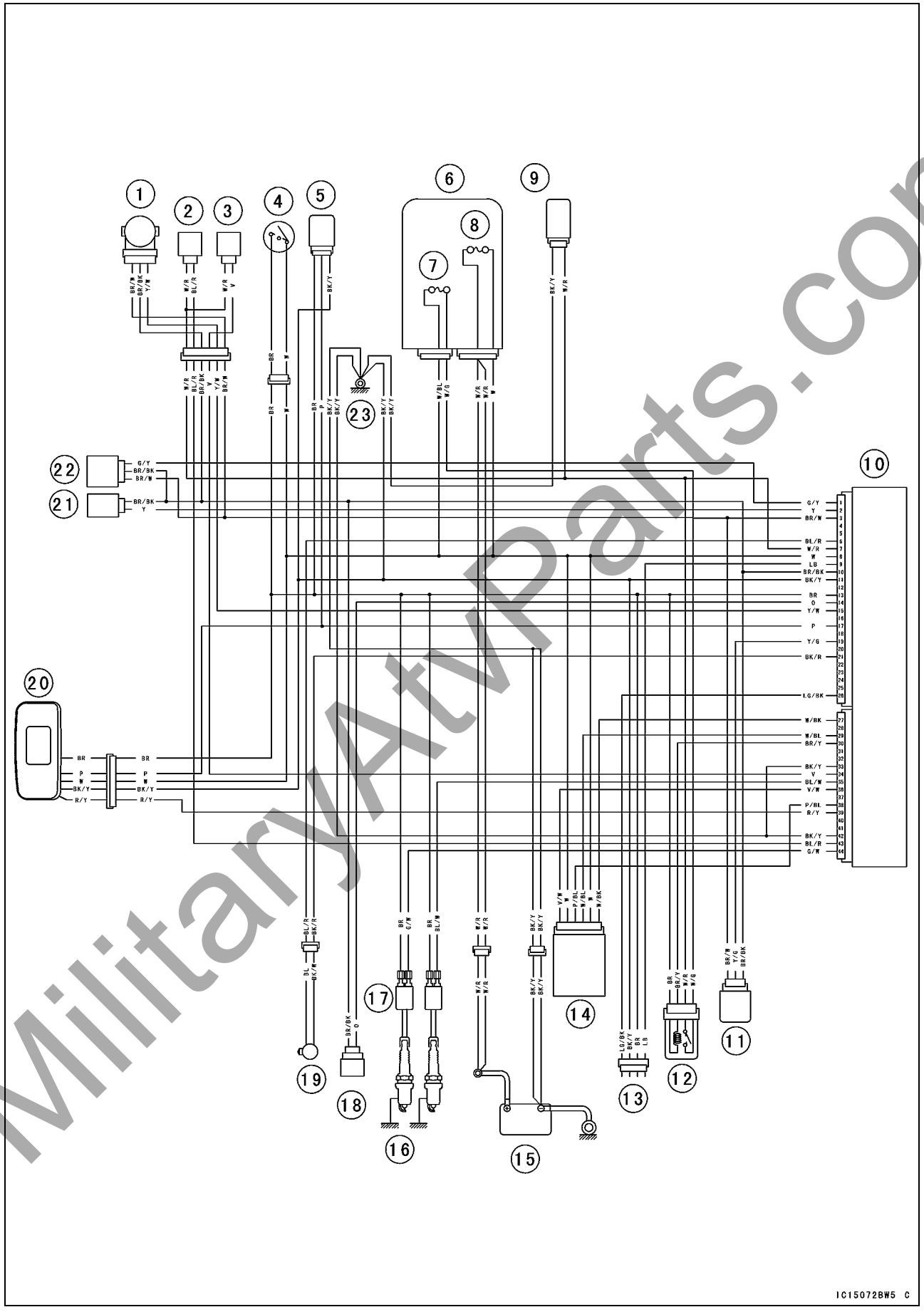
3-10 FUEL SYSTEM (DFI)

DFI System

DFI System Wiring Diagram



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DFI System

Part Name

1. Throttle Sensor
2. Fuel Injector #1
3. Fuel Injector #2
4. Ignition Switch
5. Speed Sensor
6. Fuse Box
7. Fuel Pump Fuse 10 A
8. Main Fuse 30 A
9. Fuel Pump
10. ECU (Electronic Control Unit)
11. Vehicle-down Sensor
12. Fuel Pump Relay
13. KDS (Kawasaki Diagnostic System) Connector
14. ISC Valve
15. Battery
16. Spark Plugs
17. Ignition Coils
18. Water Temperature Sensor
19. Crankshaft Sensor
20. Multifunction Meter
21. Inlet Air Temperature Sensor
22. Inlet Air Pressure Sensor
23. Frame Ground 1

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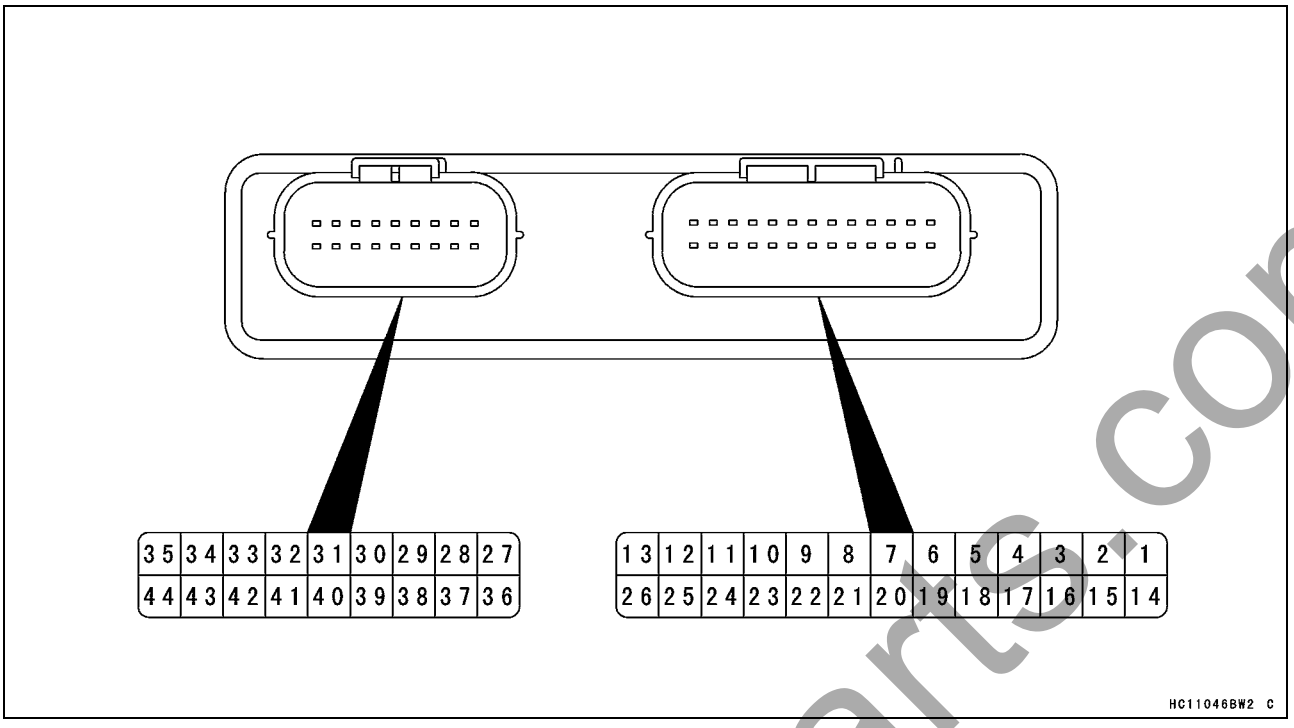
DFI System

Terminal Numbers of ECU Connectors



Terminal Names

1. Inlet Air Pressure Sensor: G/Y
2. Inlet Air Temperature Sensor: Y
3. Power Supply to Sensors: BR/W
4. Reverse Switch: R/W
5. Brake Light Switch: BL
6. Crankshaft Sensor (–): BL/R
7. Battery Monitor: W/R
8. Power Supply from Battery: W
9. External Communication Line (KDS): LG
10. Ground for Sensors: BR/BK
11. Ground for Control System: BK/Y
12. Ignition Switch: GY
13. Ignition Switch from Battery: BR
14. Water Temperature Sensor: O
15. Throttle Sensor: Y/W
16. Unused
17. Speed Sensor: P
18. Neutral Switch: LG
19. Vehicle-down Sensor: Y/G
20. Parking Brake Switch: G
21. Crankshaft Sensor (+): BK/R
22. Unused
23. Unused
24. Unused
25. Starter Button: BK/W
26. Diagnosis Terminal: LG/BK
27. ISC Valve #4: W/BK
28. 2WD/4WD Shift Switch: G
29. ISC Valve #2: W/BL
30. Fuel Pump Relay: BR/Y
31. Water Temperature Warning Indicator Symbol (LCD): W/G
32. Radiator Fan Relay: Y
33. Ground: BK/Y
34. Injector #2: V
35. Ignition Coil #2: BL/W
36. ISC Valve #1: V/W
37. 2WD/4WD Solenoid Valve: W/R
38. ISC Valve #3: P/BL
39. FI Indicator Symbol (LCD): R/Y
40. Drive Belt Check Indicator Light (LED): O/R
41. Starter Relay: BL
42. Ground: BK/Y
43. Injector #1: BL/R
44. Ignition Coil #1: G/W

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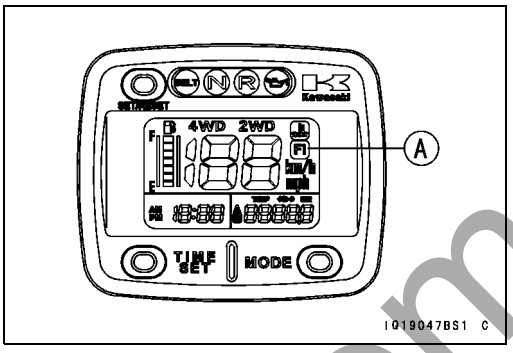
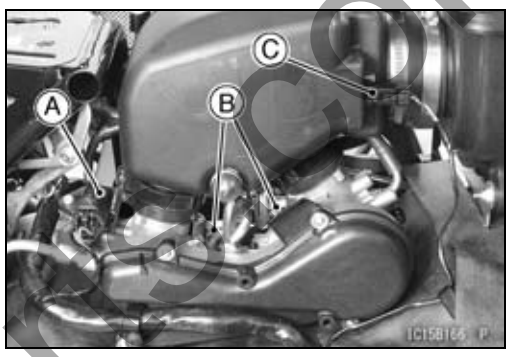
DFI Parts Location

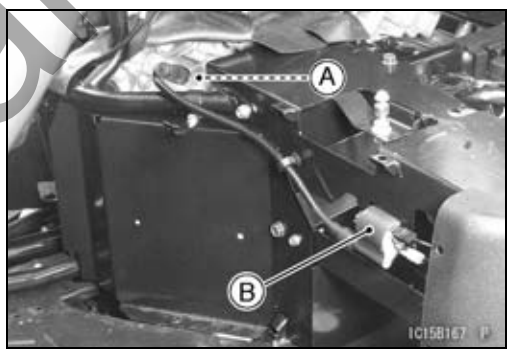
FI Indicator Symbol (LCD) [A]



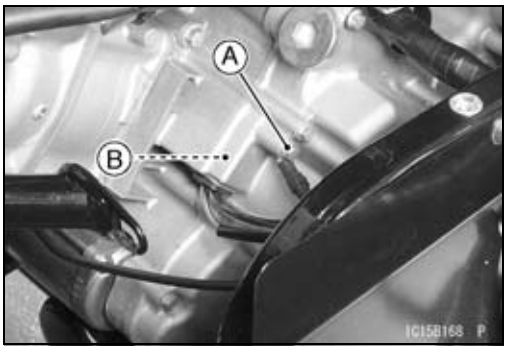
Inlet Air Pressure Sensor [A]
Fuel Injectors [B]
Inlet Air Temperature Sensor [C]



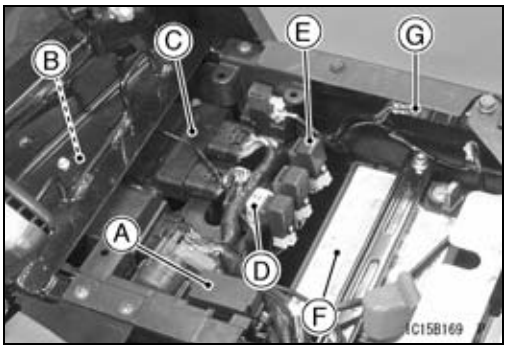
Spark Plug (Front) [A]
Ignition Coil #1 (Front) [B]



Engine Ground [A]
Crankshaft Sensor [B]



Fuse Box [A]
Vehicle-down Sensor [B]
ECU (Electronic Control Unit) [C]
KDS (Kawasaki Diagnostic System) Connector [D]
Fuel Pump Relay [E]
Battery [F]
Frame Ground 1 [G]



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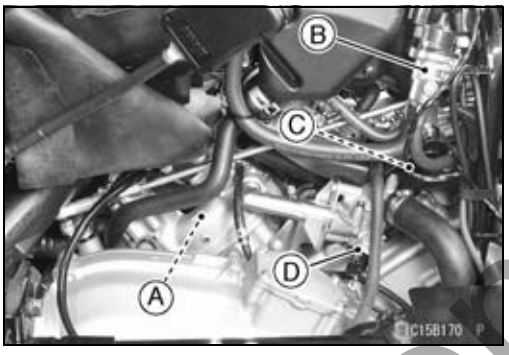
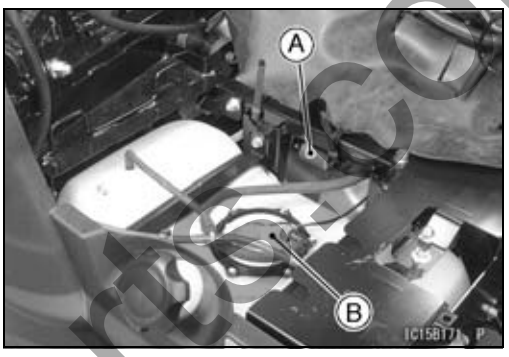
DFI Parts Location

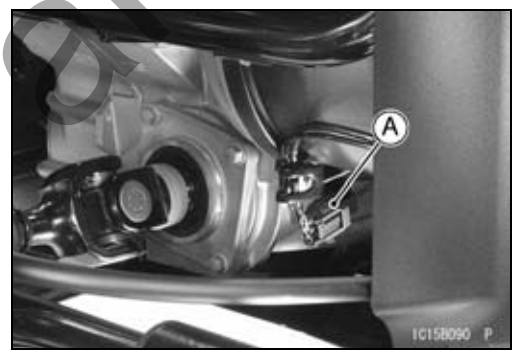
Spark Plug (Rear) [A]
ISC (Idle Speed Control) Valve [B]
Throttle Sensor [C]
Water Temperature Sensor [D]



Ignition Coil #2 (Rear) [A]
Fuel Pump [B]



Speed Sensor [A]



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* * * MILITARY USE ONLY * * *

Specifications

Item	Standard
Digital Fuel Injection System	
Idle Speed	1 100 ±50 r/min (rpm)
Throttle Body Assy:	
Type	Two barrel type
Bore	ϕ34 mm (1.34 in.)
ECU (Electronic Control Unit):	
Make	Mitsubishi Electric
Type	Digital memory type, with built in IC igniter, sealed with resin
Fuel Pressure (High Pressure Line)	294 kPa (3.0 kgf/cm², 43 psi) with engine idling
Fuel Pump:	
Type	In-tank friction pump
Discharge	50 mL (1.7 US oz.) or more for 3 seconds
Fuel Injectors:	
Type	INP-250
Nozzle Type	One spray type with 4 holes
Resistance	About 11.7 ~ 12.3 Ω at 20°C (68°F)
Throttle Sensor:	Non-adjustable and non-removable
Input Voltage	DC 4.75 ~ 5.25 V between BR/W and BR/BK leads
Output Voltage at Idle Throttle Opening	DC 1.00 ~ 1.24 V between Y/W and BR/BK leads
Output Voltage at Full Throttle Opening	DC 4.0~ 4.4 V between Y/W and BR/BK leads
Resistance	4 ~ 6 kΩ
Inlet Air Pressure Sensor:	
Input Voltage	DC 4.75 ~ 5.25 V between BR/W and BR/BK leads
Output Voltage	DC 3.80 ~ 4.20 V at standard atmospheric pressure (see this text for details)
Inlet Air Temperature Sensor:	
Resistance	5.4 ~ 6.6 kΩ at 0°C (32°F) 0.29 ~ 0.39 kΩ at 80°C (176°F)
Output Voltage at ECU	About 2.25 ~ 2.50 V at 20°C (68°F)
Water Temperature Sensor:	
Resistance	in the text
Output Voltage at ECU	About 2.24 ~ 2.48 V at 20°C (68°F)
Speed Sensor:	
Input Voltage	Battery Voltage at Ignition Switch ON
Output Voltage	less than DC 0.8 V or over than DC 4.8 V at Ignition Switch ON and 0 km/h
Vehicle-down Sensor:	
Detection Method	Magnetic flux detection method
Detection Angle	more than 55 ~ 75° for each bank
Input Voltage	DC 4.75 ~ 5.25 V
Output Voltage	with sensor arrow mark pointed up: DC 0.4 ~ 1.4 V with sensor tilted 55 ~ 75° or more: DC 3.7 ~ 4.4 V
ISC Valve:	
Resistance	28.8 ~ 31.2 Ω at 20°C (68°F)

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Specifications

Item	Standard
Engine Vacuum	29.6 ±1.3 kPa (222 ±9.8 mmHg) at Idle Speed
Throttle Pedal and Cable	
Throttle Pedal Free Play	5 ~ 10 mm (0.20 ~ 0.39 in.)
Air Cleaner	
Air Cleaner Element Oil	High-quality foam air filter oil

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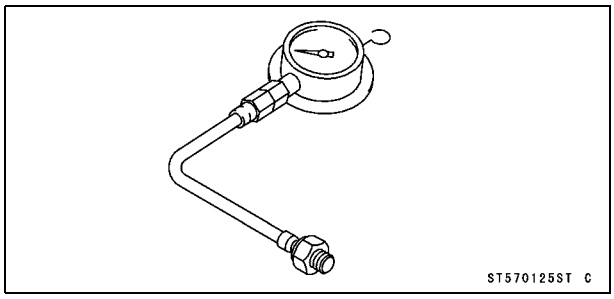
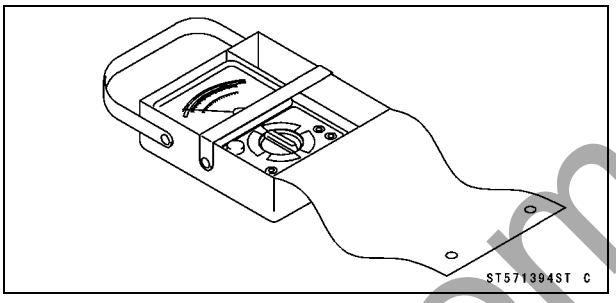
Special Tools and Sealant

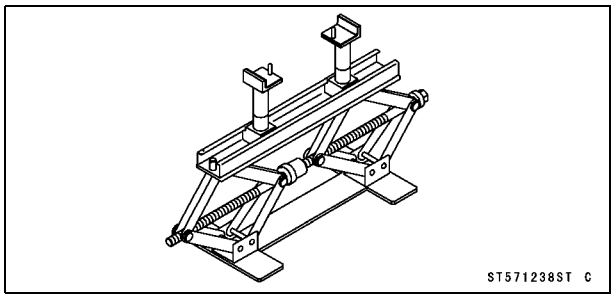
Oil Pressure Gauge, 5 kgf/cm²:
57001-125



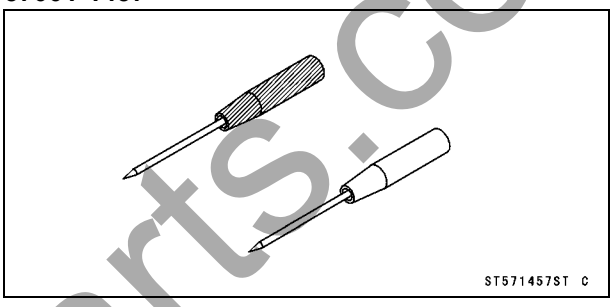
Hand Tester:
57001-1394



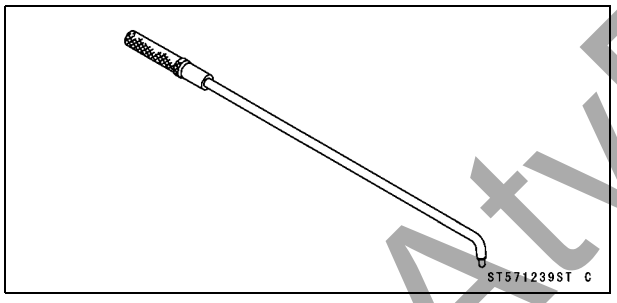
Jack:
57001-1238



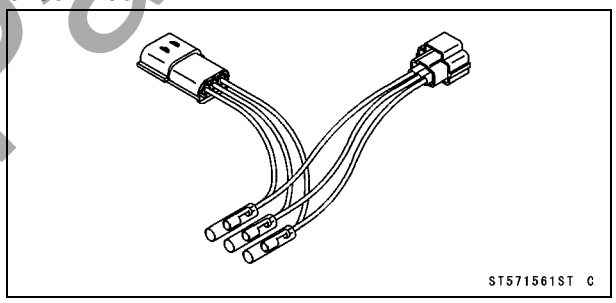
Needle Adapter Set:
57001-1457



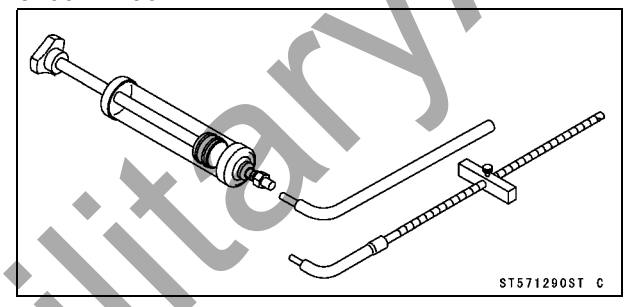
Pilot Screw Adjuster, A:
57001-1239



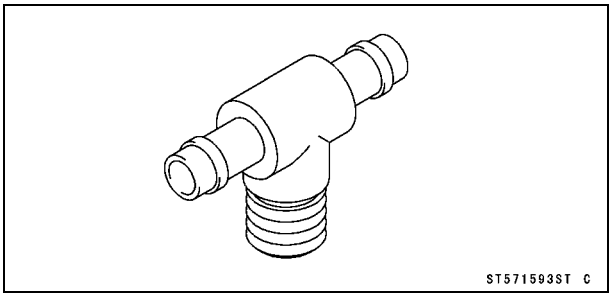
Sensor Harness Adapter:
57001-1561



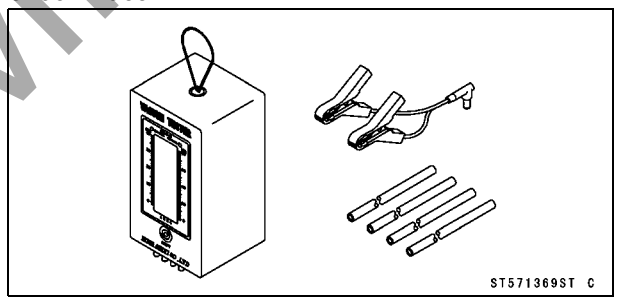
Fork Oil Level Gauge:
57001-1290



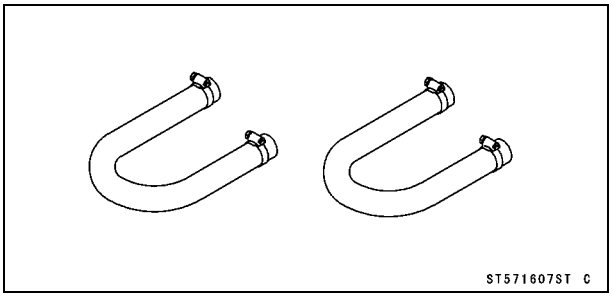
Fuel Pressure Gauge Adapter:
57001-1593



Vacuum Gauge:
57001-1369



Fuel Hose:
57001-1607



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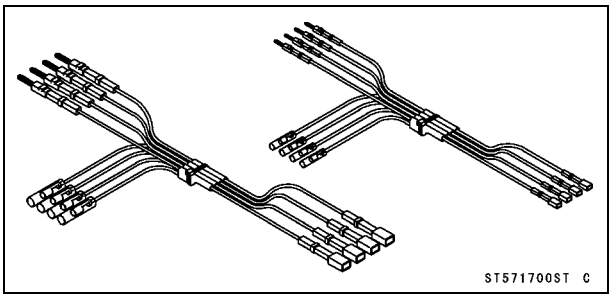
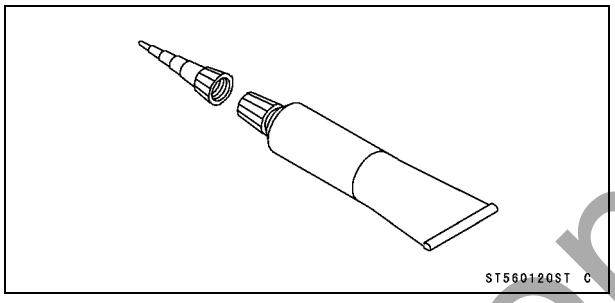
Special Tools and Sealant

Measuring Adapter:
57001-1700



Liquid Gasket, TB1211:
56019-120



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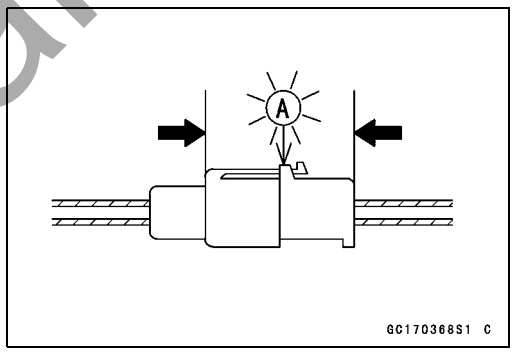
DFI Servicing Precautions

DFI Servicing Precautions

There are a number of important precautions that should be followed servicing the DFI system.

- This DFI system is designed to be used with a 12 V sealed battery as its power source. Do not use any other battery except for a 12 V sealed battery as a power source.
- Do not reverse the battery cable connections. This will damage the ECU.
- To prevent damage to the DFI parts, do not disconnect the battery cables or any other electrical connections when the ignition switch is on or while the engine is running.
- Take care not to short the cables that are directly connected to the battery positive (+) terminal to the chassis ground.
- When charging, remove the battery from the vehicle. This is to prevent ECU damage by excessive voltage.
- Do not turn the ignition switch ON while any of the DFI electrical connectors are disconnected. The ECU memorizes service codes.
- Do not spray water on the electrical parts, DFI parts, connectors, leads, and wiring.
- Whenever the DFI electrical connections are to be disconnected, first turn off the ignition switch, and disconnect the battery (–) terminal. Do not pull the lead, only the connector. Conversely, make sure that all the DFI electrical connections are firmly reconnected before starting the engine.
- Connect these connectors until they click [A].



- If a transceiver is installed on the vehicle, make sure that the operation of the DFI system is not influenced by electric wave radiated from the antenna. Check operation of the system with the engine at idle. Locate the antenna as far as possible away from the ECU.
- When any fuel hose is disconnected, fuel may spout out by residual pressure in the fuel line. Cover the hose joint with a piece of clean cloth to prevent fuel spillage.
- When any fuel hose is disconnected, do not turn on the ignition switch. Otherwise, the fuel pump will operate and fuel will spout from the fuel hose.
- Do not operate the fuel pump if the pump is completely dry. This is to prevent pump seizure.
- Before removing the fuel system parts, blow the outer surfaces of these parts clean with compressed air.
- To prevent corrosion and deposits in the fuel system, do not add to fuel any fuel antifreeze chemicals.

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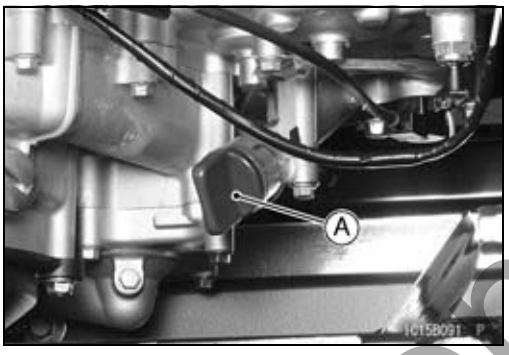
DFI Servicing Precautions



○To maintain the correct fuel/air mixture (F/A), there must be no inlet air leaks in the DFI system. Be sure to install the oil filler cap [A] after filling the engine oil.

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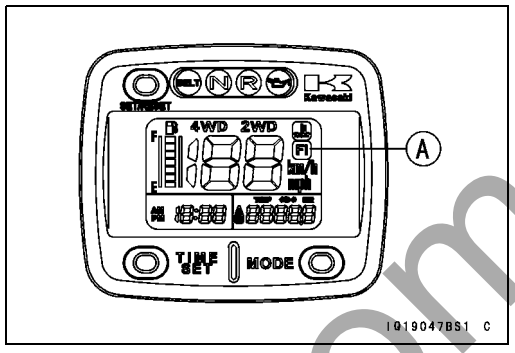
Troubleshooting the DFI System

Outline

When an abnormality in the DFI system occurs, the FI indicator symbol [A] (LCD) flashes on the meter panel to alert the driver. In addition, the condition of the problem is stored in the memory of the ECU (electronic control unit).

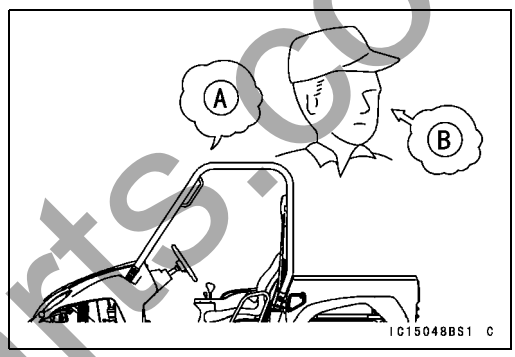


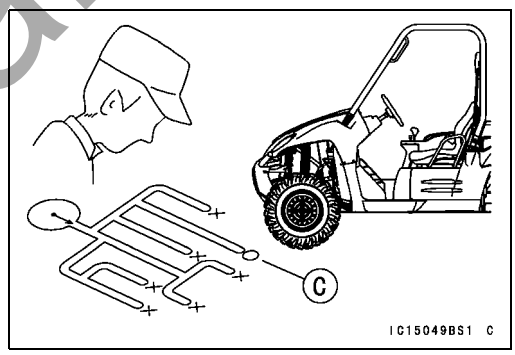
With the engine stopped and turned in the self-diagnosis mode, the service code [A] is indicated by the number of times the FI indicator symbol (LCD) blinks.

When due to a malfunction, the FI indicator symbol (LCD) remains flashed, first ask the rider about the conditions [B] of trouble, and then determine the cause [C] of problem.

First, conduct a self-diagnosis inspection and then a non-self-diagnosis inspection. The non-self-diagnosis items are not indicated by the FI indicator symbol (LCD).

Do not rely solely on the DFI self-diagnosis function, use common sense.





Even when the DFI system is operating normally, the FI indicator symbol (LCD) may appear under strong electrical interference. No repair needed. Turn the ignition switch OFF to stop the indicator symbol.

When the FI indicator symbol (LCD) flashes and the vehicle is brought in for repair, check the service codes.

When the repair has been done, the symbol disappears. But the service codes stored in memory of the ECU are not erased to preserve the problem history can be referred using the KDS (Kawasaki Diagnostic System) when solving unstable problems.

Much of the DFI system troubleshooting work consists of confirming continuity of the wiring. The DFI parts are assembled and adjusted with precision, and it is impossible to disassemble or repair them.

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Troubleshooting the DFI System

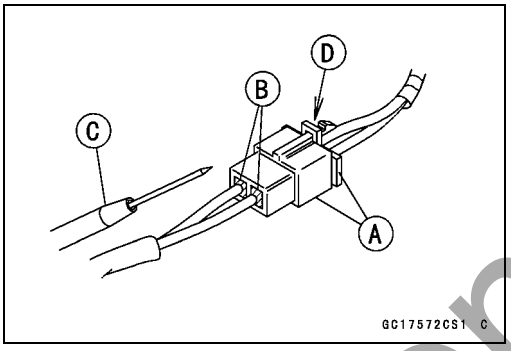
● When checking the DFI parts, use a digital meter which can be read two decimal place voltage or resistance.

○The DFI part connectors [A] have seals [B], including the ECU.

● When measuring the input or output voltage with the connector joined, use the needle adapter set [C].

Special Tool - Needle Adapter Set: 57001-1457

● Insert the needle adapters inside the seals from behind the connector until the adapter reaches the terminal.



NOTICE

Insert the needle adapter straight along the terminal in the connector to prevent short-circuit between terminals.

● Make sure that measuring points are correct in the connector, noting the position of the lock [D] and the lead color before measurement. Do not reverse connections of the digital meter.

● Be careful not to short-circuit the leads of the DFI or electrical system parts by contact between adapters.

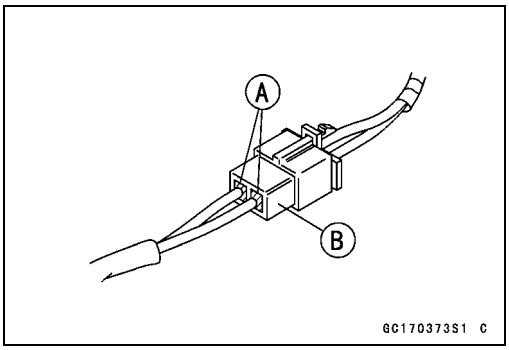
● Turn the ignition switch ON and measure the voltage with the connector joined.

NOTICE

Incorrect, reverse connection or short circuit by needle adapters could damage the DFI or electrical system parts.

○After measurement, remove the needle adapters and apply silicone sealant to the seals [A] of the connector [B] for waterproofing.

Sealant - Liquid Gasket, TB1211: 56019-120



● Always check battery condition before replacing the DFI parts. A fully charged battery is a must for conducting accurate tests of the DFI system.

● Trouble may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the problem. If the problem was caused by some other item or items, they too must be repaired or replaced, or the new replacement part will soon fail again.

● Measure coil winding resistance when the DFI part is cold (at room temperature).

● Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, short, etc. Deteriorated wires and bad connections can cause reappearance of problems and unstable operation of the DFI system.

★If any wiring is deteriorated, replace the wiring.

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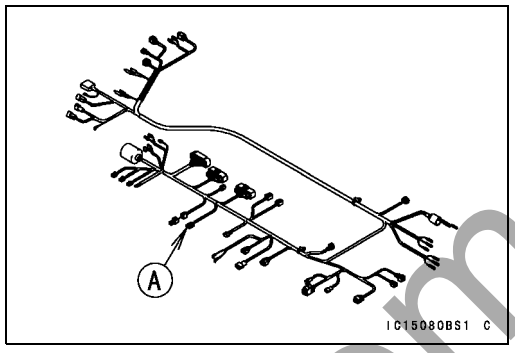
Troubleshooting the DFI System

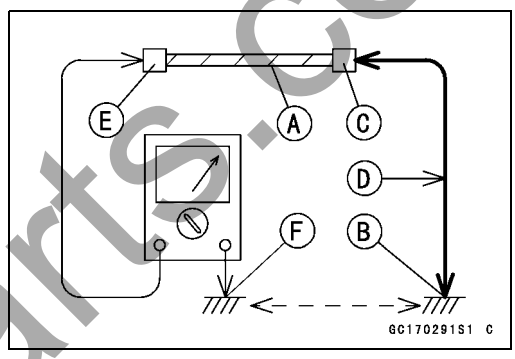
● Pull each connector [A] apart and inspect it for corrosion, dirt, and damage.
★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it. Connect the connectors securely.
● Check the wiring for continuity.
○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.
○Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

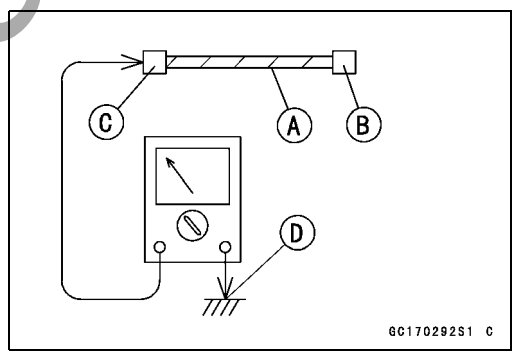


○Set the tester to the × 1 Ω range, and read the tester.
★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the main harness or the sub harness.

○If both ends of a harness [A] are far apart, ground [B] the one end [C], using a jumper lead [D] and check the continuity between the end [E] and the ground [F]. This enables to check a long harness for continuity. If the harness is open, repair or replace the harness.



○When checking a harness [A] for short circuit, open one end [B] and check the continuity between the other end [C] and ground [D]. If there is continuity, the harness has a short circuit to ground, and it must be repaired or replaced.



● Narrow down suspicious locations by repeating the continuity tests from the ECU connectors.
★If no abnormality is found in the wiring or connectors, the DFI parts are the next likely suspects. Check the part, starting with input and output voltages. However, there is no way to check the ECU itself.
★If an abnormality is found, replace the affected DFI part.
★If no abnormality is found in the wiring, connectors, and DFI parts, replace the ECU.

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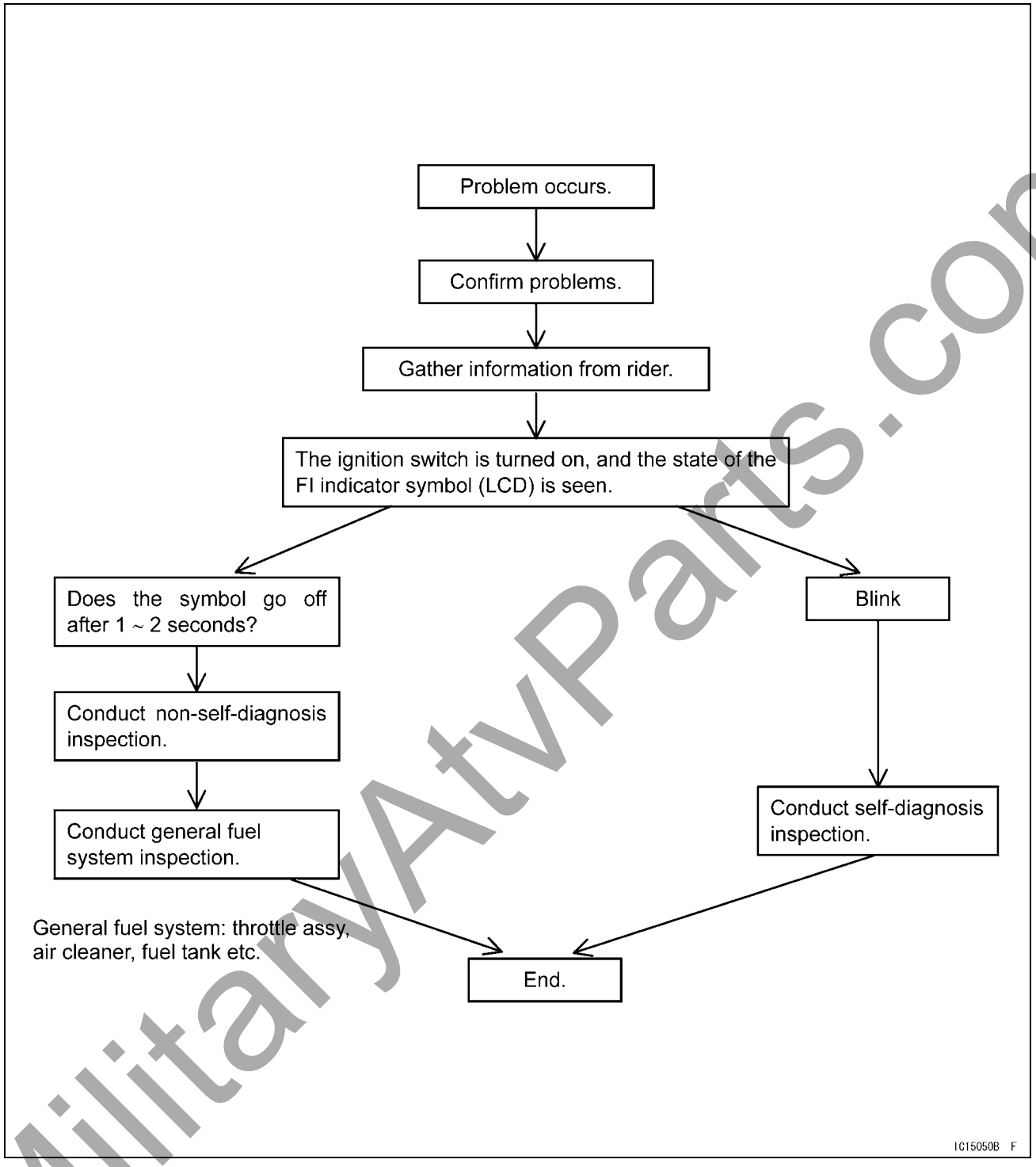
Troubleshooting the DFI System

DFI Diagnosis Flow Chart


Problem occurs.
Confirm problems.
Gather information from rider.
The ignition switch is turned on, and the state of the FI indicator symbol (LCD) is seen.
Does the symbol go off after 1 ~ 2 seconds?
Blink
Conduct non-self-diagnosis inspection.
Conduct self-diagnosis inspection.
Conduct general fuel system inspection.
General fuel system: throttle assy, air cleaner, fuel tank etc.
End.
IC15050B F

Inquiries to Rider

○Each rider reacts to problems in different ways, so it is important to confirm what kind of symptoms the rider has encountered.
○Try to find out exactly what problem occurred under exactly what conditions by asking the rider; knowing this information may help you reproduce the problem.
○The following sample diagnosis sheet will help prevent you from overlooking any areas, and will help you decide if it is a DFI system problem, or a general engine problem.

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Troubleshooting the DFI System

Sample Diagnosis Sheet

Rider name:	**Registration No. (license plate No.):**
Year of initial registration:	**Model:**
Engine No.:	**Frame No.:**
Date problem occurred:	**Mileage:**
Environment when problem occurred.	
Weather	□fine, □cloudy,□rain, □snow, □always, □other:
Temperature	□hot, □warm, □cold, □very cold, □always
Problem frequency	□chronic, □often, □once
Road	□street, □mountain road (□uphill, □downhill), □bumpy, □pebble
Altitude	□normal, □high (about 1 000 m or more)
Vehicle conditions when problem occurred.	
FI indicator symbol (LCD)	□symbol appears immediately after ignition switch ON, and disappear after 1 ~ 2 seconds (normal).
	□symbol blinks after ignition switch ON (DFI problem).
	□symbol does not appear. (multifunction meter, ECU or its wiring fault)
	□sometimes symbol appears. (probably wiring fault)
Starting difficulty	□starter motor not rotating.
	□starter motor rotating but engine doesn't turn over.
	□starter motor and engine don't turn over.
	□no fuel flow (□no fuel in tank, □no fuel pump sound).
	□engine flooded (do not crank engine with throttle opened, which promotes engine flooding).
	□no spark.
	□other:
Engine stops	□right after starting.
	□when depressing throttle pedal.
	□when returning throttle pedal.
	□when moving off.
	□when stopping the vehicle.
	□when cruising.
	□other:
Poor running at low speed	□very low idle speed, □very high idle speed, □rough idle speed
	□battery voltage is low (charge the battery)
	□spark plug loose (tighten it)
	□spark plug dirty, broken, or gap maladjusted (remedy it).
	□backfiring
	□afterfiring
	□hesitation when acceleration
	□engine oil viscosity too high
	□brake dragging
	□engine overheating
	□other:

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Troubleshooting the DFI System

Poor running or no power at high speed	☐spark plug loose (tighten it)
	☐spark plug dirty, broken, or gap maladjusted (remedy it).
	☐spark plug incorrect (replace it)
	☐knocking (fuel poor quality or incorrect)
	☐brake dragging
	☐clutch slipping
	☐engine overheating
	☐engine oil level too high
	☐engine oil viscosity too high
	☐other:

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DFI System Troubleshooting Guide

NOTE

- *This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties in DFI system.*
- *The ECU may be involved in the DFI electrical and ignition system troubles. If these parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.*

Engine Won't Turn Over

Symptoms or possible Causes	Actions (chapter)
Neutral switch trouble	Inspect neutral switch (see chapter 16).
Crankshaft sensor trouble	Inspect (see chapter 16).
Ignition coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU ground and power supply trouble	Inspect (see chapter 3).
ECU trouble	Inspect (see chapter 3).
No or little fuel in tank	Supply fuel (see Owner's Manual).
Fuel injector trouble	Inspect and replace (see chapter 3).
Fuel pump not operating	Inspect (see chapter 3).
Fuel pump relay trouble	Inspect and replace (see chapter 3).
Fuel filter or pump screen clogged	Replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).

Poor Running at Low Speed

Symptoms or Possible Causes	Actions (chapter)
Spark weak:	
Ignition coil shorted or not in good contact	Inspect or reinstall (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Little fuel in tank	Supply fuel (see Owner's Manual).
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Throttle body assy holder loose	Reinstall (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel filter or pump screen clogged	Replace fuel pump (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).

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DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Unstable (rough) idling:	
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Engine stalls easily:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Ignition coil trouble	Inspect (see chapter 16).
Throttle sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Fuel pressure too low or too high	Inspect (see chapter 3).
Fuel pressure regulator trouble	Inspect fuel pressure and replace fuel pump (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Poor acceleration:	
Fuel pressure too low	Inspect (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel filter or pump screen clogged	Replace fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Ignition coil trouble	Inspect (see chapter 16).
Stumble:	
Fuel pressure too low	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Surge:	

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DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Unstable fuel pressure	Fuel pressure regulator trouble (Inspect and replace fuel pump) or kinked fuel line (Inspect and repair fuel line) (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Backfiring when deceleration:	
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Fuel pressure too low	Inspect (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
After fire:	
Spark plug burned or gap maladjusted	Replace (see chapter 2).
Fuel injector trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Other:	
Intermittent any DFI fault and its recovery	Check that DFI connectors are clean and tight, and examine leads for signs of burning or fraying (see chapter 3).

Poor Running or No Power at High Speed:

Symptoms or Possible Causes	Actions (chapter)
Firing incorrect:	
Ignition coil shorted or not in good contact	Inspect or Reinstall (see chapter 16).
Ignition coil trouble	Inspect (see chapter 16).
Spark plug dirty, broken or gap maladjusted	Inspect and replace (see chapter 2).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
ECU trouble	Inspect (see chapter 3).
Fuel/air mixture incorrect:	
Air cleaner clogged, poorly sealed, or missing	Clean element or inspect sealing (see chapter 2).
Air duct loose	Reinstall (see chapter 3).
Water or foreign matter in fuel	Change fuel. Inspect and clean fuel system (see chapter 3).
Fuel injector O-ring damage	Replace (see chapter 3).
Fuel injector clogged	Inspect and repair (see chapter 3).
Fuel line clogged	Inspect and repair (see chapter 3).
Fuel pump operates intermittently and often DFI fuse blows.	Fuel pump bearings may wear. Replace the fuel pump (see chapter 3).
Fuel pump trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).

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DFI System Troubleshooting Guide

Symptoms or Possible Causes	Actions (chapter)
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Throttle sensor trouble	Inspect (see chapter 3).
Knocking:	
Fuel poor quality or incorrect	Fuel change (Use the gasoline recommended in the Owner's Manual).
Spark plug incorrect	Replace it with the correct plug (see chapter 2).
Ignition coil trouble	Inspect (see chapter 16).
ECU trouble	Inspect (see chapter 3).
Inlet air pressure sensor trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
Miscellaneous:	
Speed sensor trouble	Inspect (see chapter 3).
Throttle valves will not fully open	Inspect throttle cables and lever linkage (see chapter 3).
Engine overheating - Water temperature sensor, crankshaft sensor or speed sensor trouble	(see Overheating of Troubleshooting Guide in chapter 17)
Exhaust Smokes Excessively:	
(Black smokes)	
Air cleaner element clogged	Clean element (see chapter 2).
Fuel pressure too high	Inspect (see chapter 3).
Fuel injector trouble	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).
(Brown smoke)	
Air duct loose	Reinstall (see chapter 3).
Fuel pressure too low	Inspect (see chapter 3).
Water temperature sensor trouble	Inspect (see chapter 3).
Inlet air temperature sensor trouble	Inspect (see chapter 3).

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Self-Diagnosis

Self-diagnosis Outline

The self-diagnosis system has two modes and can be switched to another mode by grounding the self-diagnosis terminal (LG/BK) in the KDS connector.

User Mode

The ECU notifies the rider of troubles in DFI system and ignition system by flashing the FI indicator symbol when DFI system and ignition system parts are faulty, and initiates fail-safe function. In case of serious troubles, the ECU stops the injection/ignition/starter motor operation.

Dealer Mode

The ECU generate service code(s) to show the problem(s) which the DFI system, and ignition system have at the moment of diagnosis.

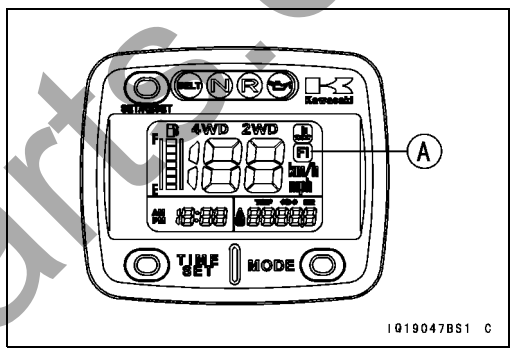
Self-diagnosis Procedures

○When a problem occurs with the DFI system and ignition system, the FI indicator symbol [A] (LCD) flashes.

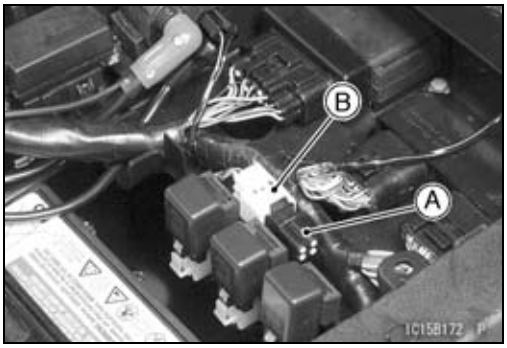
NOTE

○*Use a fully charged battery when conducting self-diagnosis.*

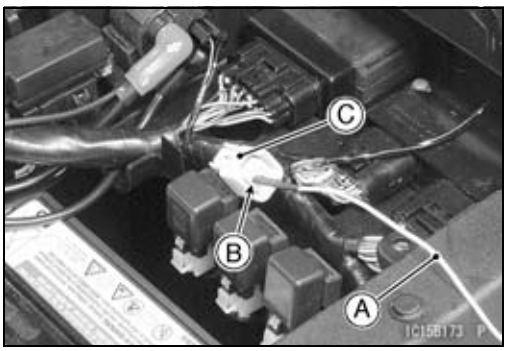
○*Keep the self-diagnosis terminal grounded during self -diagnosis, with an auxiliary lead.*



- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
- Remove the cap [A] from the KDS connector [B] (white).



- Connect an auxiliary lead [A] into the self-diagnosis terminal [B] (LG/BK) in the KDS connector [C] for grounding.
- Turn on the ignition switch.



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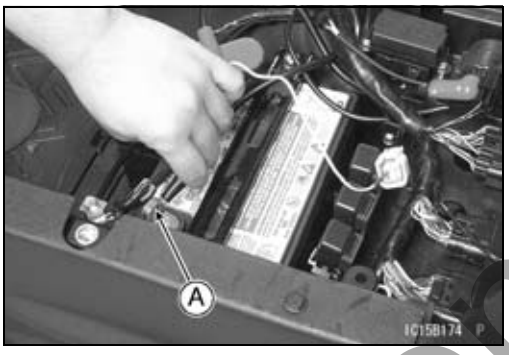
Self-Diagnosis

- To enter the self-diagnosis dealer mode, ground the self -diagnosis terminal to the battery (–) terminal [A] for more than 2 seconds, and then keep it grounded continuously.
- Count the blinks of the FI indicator symbol to read the service code.
- Keep the auxiliary lead ground until you finish reading the service code.



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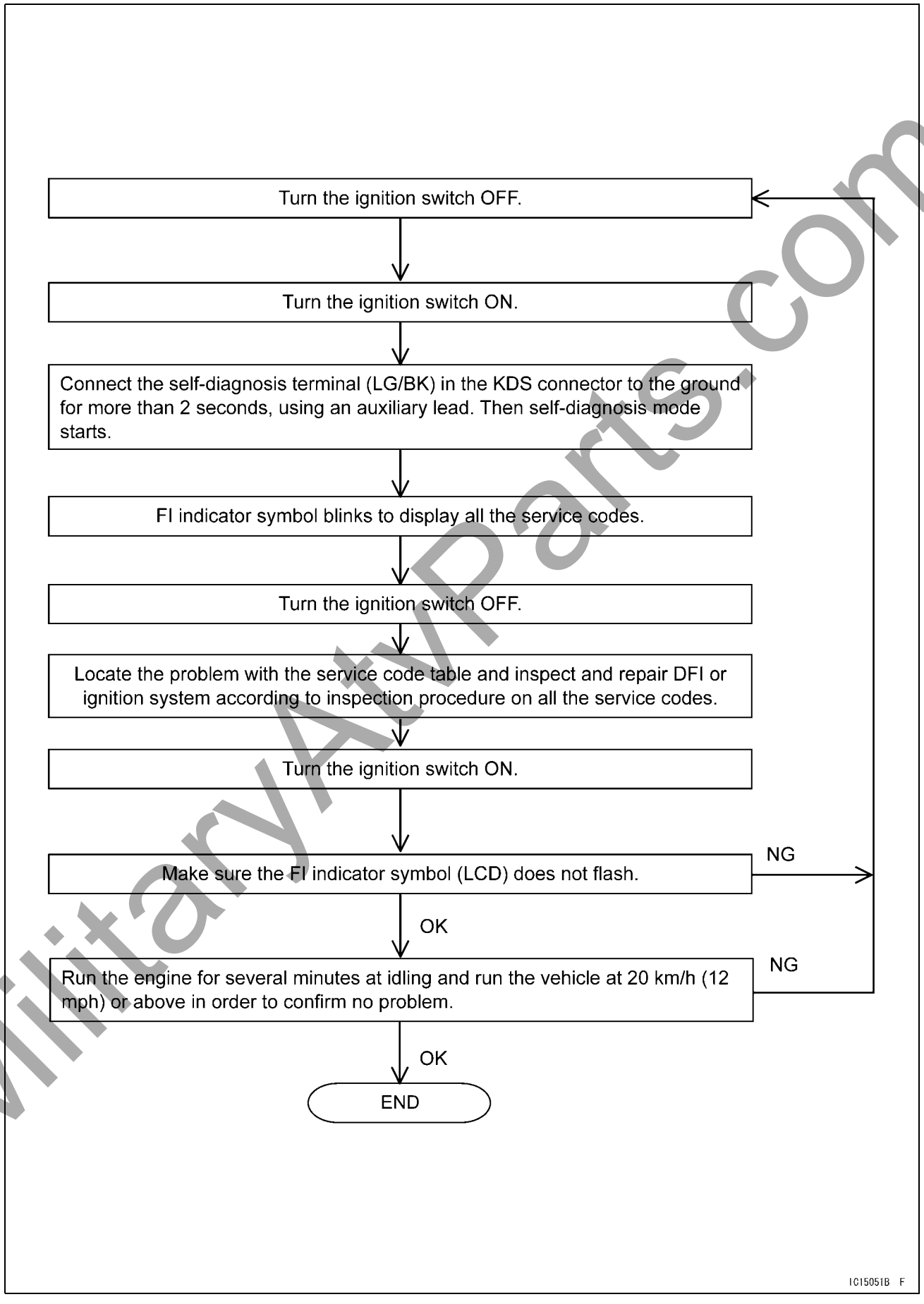
Self-Diagnosis

Self-Diagnosis Flow Chart


Turn the ignition switch OFF.
Turn the ignition switch ON.
Connect the self-diagnosis terminal (LG/BK) in the KDS connector to the ground for more than 2 seconds, using an auxiliary lead. Then self-diagnosis mode starts.
FI indicator symbol blinks to display all the service codes.
Turn the ignition switch OFF.
Locate the problem with the service code table and inspect and repair DFI or ignition system according to inspection procedure on all the service codes.
Turn the ignition switch ON.
Make sure the FI indicator symbol (LCD) does not flash.
NG
OK
Run the engine for several minutes at idling and run the vehicle at 20 km/h (12 mph) or above in order to confirm no problem.
NG
OK
END
IC15051B F

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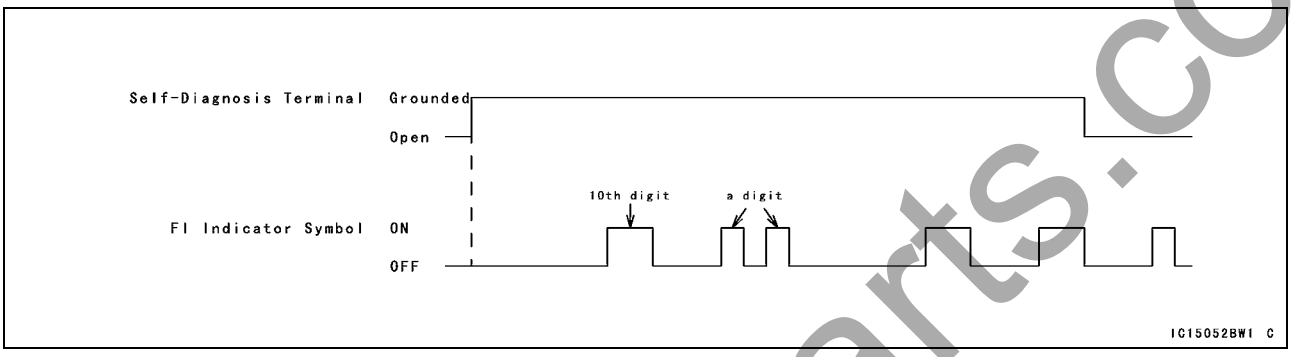
Self-Diagnosis

How to Read Service Codes

○Service codes are shown by a series of long and short blinks of the FI indicator symbol as shown below.
○Read 10th digit and unit digit as the FI indicator symbol blinks.
○When there are a number of problems, all the service codes can be stored and the display will begin starting from the lowest number service code in the numerical order. Then after completing all codes, the display is repeated until the self-diagnosis terminal is opened.
○For example, if two problems occurred in the order of 21, 12, the service codes are displayed from the lowest number in the order listed.
(12 → 21) → (12 → 21) → · · · (repeated)
○If there is no problem or when the repair has been done, no service code is shown.



Service Code Erasing

○When repair has been done, FI indicator light will not show service codes any more.
★But the service codes stored in memory of the ECU are not erased to preserve the problem history. In this model, the problem history cannot be erased.

Service Code Table

Service Code	FI Indicator Light	Problems
11	ON OFF	Throttle sensor malfunction, wiring open or short
12		Inlet air pressure sensor malfunction, wiring open or short
13		Inlet air temperature sensor malfunction, wiring open or short
14		Water temperature sensor malfunction, wiring open or short
21		Crankshaft sensor malfunction, wiring open or short
24		Speed sensor malfunction, wiring open or short
31		Vehicle-down sensor, malfunction, wiring open or short
46		Fuel pump relay malfunction, relay is stuck

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Self-Diagnosis

Service Code	FI Indicator Light	Problems
51		Ignition coil #1 malfunction, wiring open or short
52		Ignition coil #2 malfunction, wiring open or short

Notes:

- The ECU may be involved in these problems. If all the parts and circuits are checked out good, be sure to check the ECU for ground and power supply. If the ground and power supply are checked good, replace the ECU.
- When no service code is displayed, the electrical parts of the DFI system has no fault, and the mechanical parts of the DFI system and the engine are suspect.

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Self-Diagnosis

Backups

○The ECU takes the following measures to prevent engine damage when the DFI or the ignition system parts have troubles.

Service Codes	Parts	Output Signal Usable Range or Criteria	Backups by ECU
11	Throttle Sensor	Throttle Sensor Output Voltage 0.2 ~ 4.8 V	If the throttle sensor system fails (the signal is out of the usable range, wiring short or open), the ECU locks ignition timing into the ignition timing at opened throttle position and sets the DFI in the D-J method (1). Also, the throttle sensor system and inlet air pressure sensor fails, the ECU locks ignition timing into the ignition timing at opened throttle position and sets the DFI in the α-N method (1).
12	Inlet Air Pressure Sensor	Inlet Air Pressure Sensor Output Voltage 0.2 ~ 4.8 V	If the inlet air pressure sensor system fails (the signal Pv is out of the usable range, wiring short or open), the ECU sets the DFI in the α - N method.
13	Inlet Air Temperature Sensor	Inlet Air Temperature Sensor Output Voltage 0.2 ~ 4.6 V	If the inlet air temperature sensor fails (the signal is out of the usable range, wiring short or open), the ECU sets Ta at 30°C.
14	Water Temperature Sensor	Water Temperature Sensor Output Voltage 0.2 ~ 4.85 V	If the water temperature sensor system fails (the signal is out of the usable range, wiring short or open), the ECU sets Tw at 80°C.
21	Crankshaft Sensor	Crankshaft sensor must send 22 signals (output signal) to the ECU at the one cranking.	If crankshaft sensor does not generate signals, the engine stops by itself.
24	Speed Sensor	Speed sensor must send 21 signals (output signal) to the ECU at the one rotation of the output driven bevel gear.	If the speed sensor system fails (no signal, wiring short or open), the speedometer shows 0.
31	Vehicle-down Sensor	Vehicle-down Sensor Output Voltage Vd = 0.2 ~ 4.6 V	If the vehicle-down sensor system has failures (the output voltage Vd is more than usable range, wiring open), the ECU shuts off the fuel pump.
46	Fuel Pump Relay	When the relay ON condition, battery monitor voltage 5 V or more	If the relay fails, battery monitor voltage 12 V.
51	Ignition Coil #1	The ignition coil primary winding must send signals (output voltage) continuously to the ECU.	If the ignition primary winding #1 has failures (no signal, wiring short or open), the ECU shuts off the injector #1 to stop fuel to the cylinder #1, though the engine keeps running.
52	Ignition Coil #2	The ignition coil primary winding must send signals (output voltage) continuously to the ECU.	If the ignition primary winding #2 has failures (no signal, wiring short or open), the ECU shuts off the injector #2 to stop fuel to the cylinder #2, though the engine keeps running.

Note:

(1) D-J Method and α - N Method: When the engine load is light like at idling or low speed, the ECU determines the injection quantity by calculating from the throttle vacuum (inlet air pressure sensor output voltage) and engine speed (crankshaft sensor output voltage). This method is called D-J

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method (low-speed mode). As the engine speed increases, and the engine load turns middle to heavy, the ECU determines the injection quantity by calculating from the throttle opening (throttle sensor output voltage) and the engine speed. This method is called α - N method (high-speed mode).

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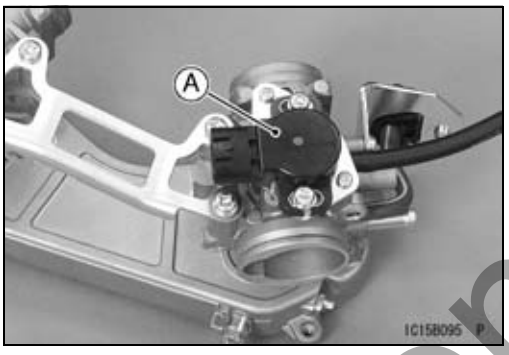
Throttle Sensor (Service Code 11)

Throttle Sensor Removal/Adjustment

NOTICE

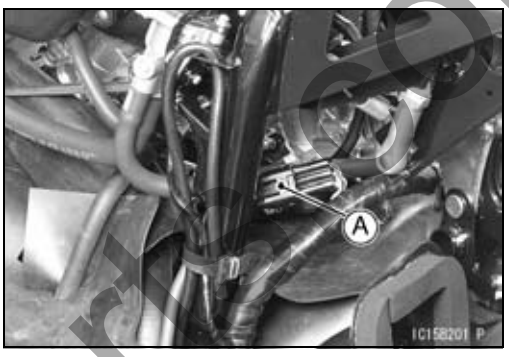
Do not remove or adjust the throttle sensor [A] since it has been adjusted and set with precision at the factory.
Never drop the throttle body assy, especially on a hard surface. Such a shock to the sensor can damage it.



Throttle Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*



- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
- Connect a digital meter to the connector [A] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Connections:
Meter (+) → BR/W lead
Meter (–) → BR/BK lead

- Measure the input voltage with the engine stopped and with the connector joined.
- Turn the ignition switch ON.

Throttle Sensor Input Voltage
Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch OFF.

★If the input voltage is normal, check the output voltage (see Throttle Sensor Output Voltage Inspection).
★If the input voltage is less than the standard, check the wiring for continuity (see Throttle Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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Throttle Sensor (Service Code 11)

Throttle Sensor Output Voltage Inspection

- Measure the output voltage in the same way as input voltage inspection. Note the following.
- Connect a digital meter to the connector [A] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Connections to Adapter:
Meter (+) → Y/W lead
Meter (–) → BR/BK lead

- Start the engine and warm it up thoroughly.
- Check idle speed to ensure the throttle opening is correct.

Idle Speed
Standard: 1 100 ±50 r/min (rpm)

★If the idle speed is out of the specified range, adjust it (see Idle Speed Inspection in the Periodic Maintenance chapter).

- Turn the ignition switch OFF.
- Measure the output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Throttle Sensor Output Voltage
Standard: DC 1.00 ~ 1.24 V at idle throttle opening
DC 4.0 ~ 4.4 V at full throttle opening (for reference)

NOTE

○*Open the throttle, confirm the output voltage will be raise.*
○*The standard voltage refers to the value when the voltage reading at the Input Voltage Inspection shows 5 V exactly.*
○*When the input voltage reading shows other than 5 V, derive a voltage range as follows.*
Example:
In the case of a input voltage of 4.75 V.
1.00 × 4.75 ÷ 5.00 = 0.95 V
1.24 × 4.75 ÷ 5.00 = 1.18 V
Thus, the valid range is 0.95 ~ 1.18 V

- Turn the ignition switch OFF.

★If the output voltage is out of the standard, inspect the throttle sensor resistance (see Throttle Sensor Resistance Inspection).
★If the output voltage is normal, check the wiring for continuity (see Throttle Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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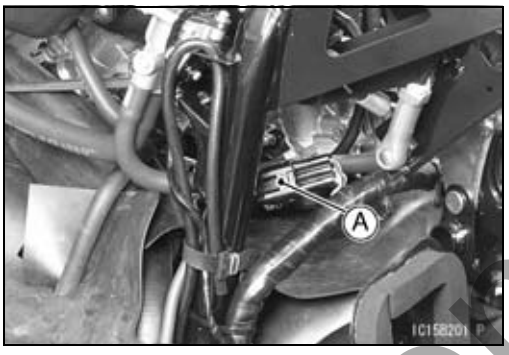
Throttle Sensor (Service Code 11)

Throttle Sensor Resistance Inspection



- Turn the ignition switch OFF.
- Disconnect the harness connector [A].
- Connect a digital meter to the throttle sensor lead connector.

○Do not connect the main harness connector.

Connections:
BR/W lead ←→ BR/BK lead

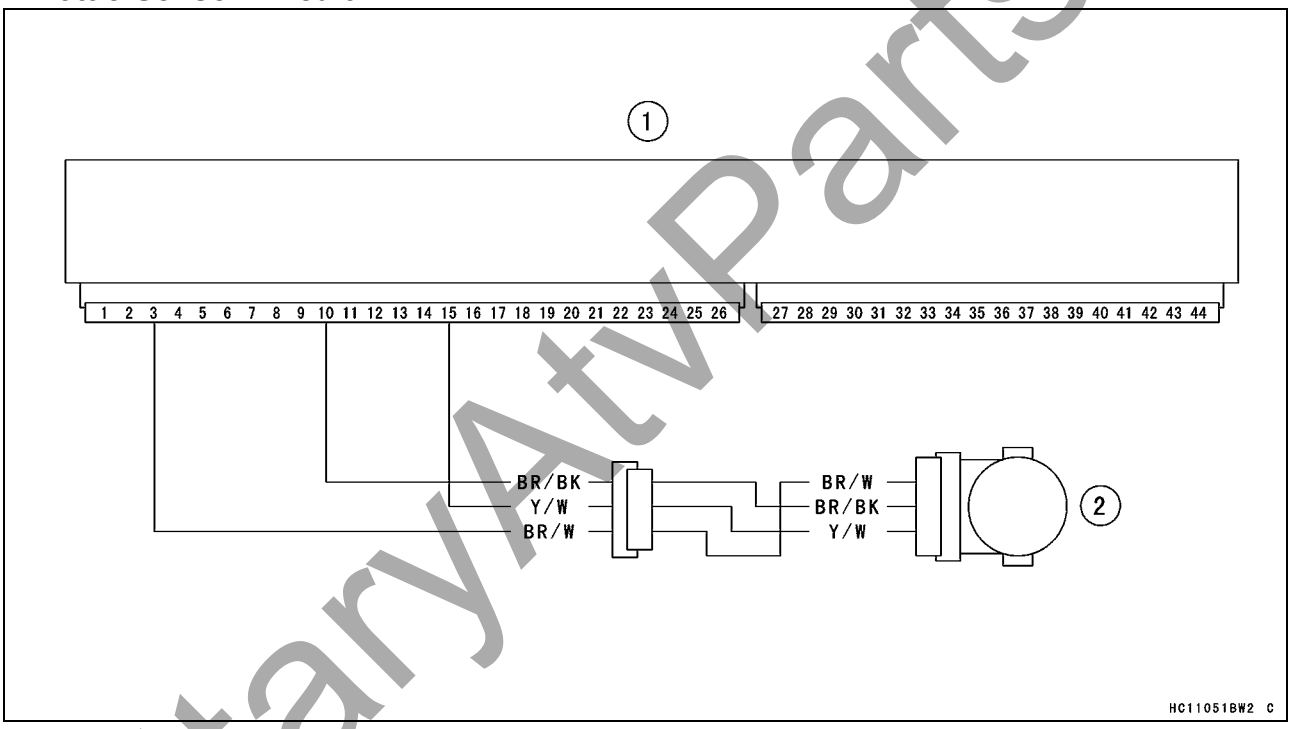
- Measure the throttle sensor resistance.

Throttle Sensor Resitance
Standard: 4 ~ 6 kΩ

★If the reading is out of the range, replace the throttle body assy.

★If the reading is within the range, but the problem still exists, replace the ECU (see ECU Removal/Installation).

Throttle Sensor Circuit



1. ECU (Electronic Control Unit)
2. Throttle Sensor

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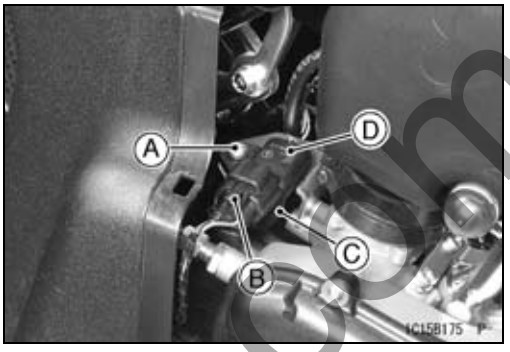
Inlet Air Pressure Sensor (Service Code 12)

NOTICE

Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

Inlet Air Pressure Sensor Removal



- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Screw [A]
- Disconnect the inlet air pressure sensor connector [B] and the vacuum hose [C].
- Remove the inlet air pressure sensor [D].

Inlet Air Pressure Sensor Installation

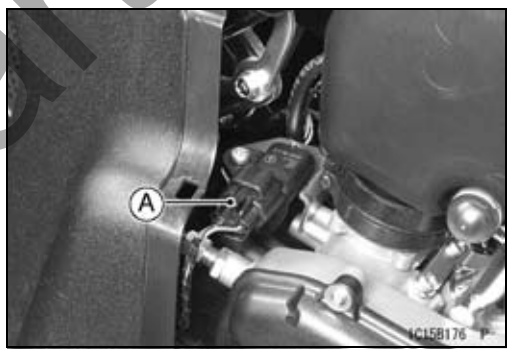
- Installation is the reverse of removal.

Torque - Inlet Air Pressure Sensor Mounting Screw: 5.0 N·m (0.51 kgf·m, 44 in·lb)

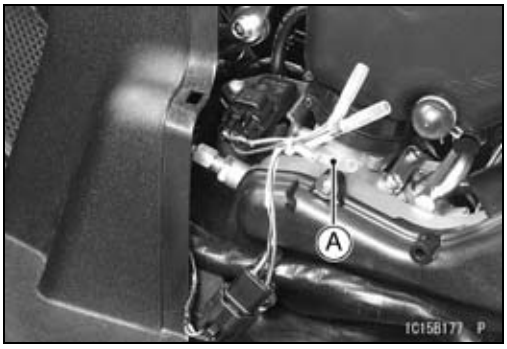
Inlet Air Pressure Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*



- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Disconnect the inlet air pressure sensor connector [A].



- Connect the measuring adapter [A] between the main harness connector and inlet air pressure sensor.

Special Tool - Sensor Harness Adapter: 57001-1561

- Connect a digital meter to the harness adapter leads.

Connections to Adapter:
Meter (+) → G/W lead (BR/W lead of Main Harness)
Meter (–) → BK lead (BR/BK lead of Main Harness)

- Measure the input voltage with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.

Inlet Air Pressure Sensor Input Voltage
Standard: DC 4.75 ~ 5.25 V

★If the reading is within the standard range, check the output voltage (see Inlet Air Pressure Sensor Output Voltage Inspection).
★If the reading is less than the standard check the wiring for continuity (see Inlet Air Pressure Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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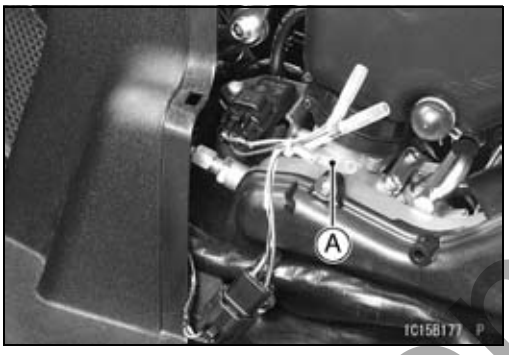
Inlet Air Pressure Sensor (Service Code 12)

Inlet Air Pressure Sensor Output Voltage Inspection



NOTE

○*The output voltage changes according to the local atmospheric pressure.*

- Measure the output voltage at the input air pressure in the same way as input voltage inspection. Note the following.
- Disconnect the inlet air pressure sensor connector and connect the harness adapter [A] between these connectors.

Special Tool - Sensor Harness Adapter: 57001-1561

- Connect a digital meter to the harness adapter leads.

Connections to Adapter:
Meter (+) → G lead (G/Y lead of Main Harness)
Meter (–) → BK lead (BR/BK lead of Main Harness)

- Measure the output voltage with the engine stopped, and with the connector joined.
- Turn the ignition switch ON.

Inlet Air Pressure Sensor Output Voltage
Usable Range: DC 3.80 ~ 4.20 V at the standard atmospheric pressure (101.32 kPa, 76 cmHg abs.)

- Turn the ignition switch OFF.

★If the output voltage is within the usable range, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

★If the output voltage is out of the usable range, check the wiring for continuity (see Inlet Air Pressure Sensor Circuit).

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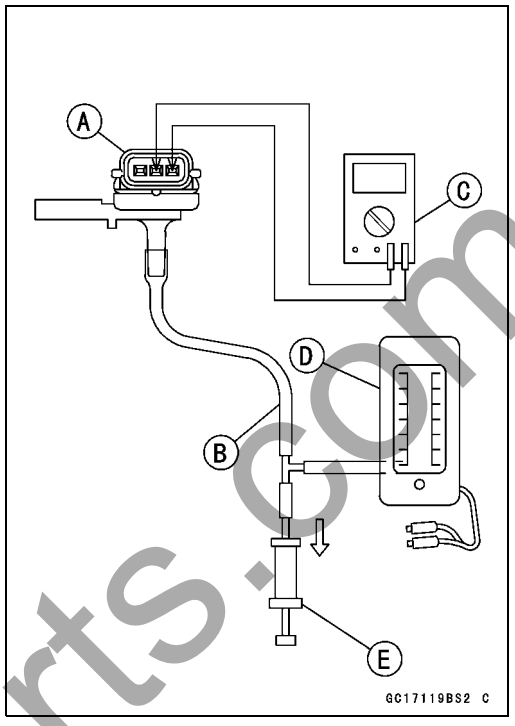
Inlet Air Pressure Sensor (Service Code 12)

★If the wiring is good, check the sensor for various vacuum.
- Remove the inlet air pressure sensor [A] and disconnect the vacuum hose from the sensor.
- Connect an auxiliary hose [B] to the inlet air pressure sensor.
- Temporarily install the inlet air pressure sensor.
- Connect a digital meter [C], vacuum gauge [D], the fork oil level gauge [E] and the harness adapter to the inlet air pressure sensor.

Special Tools - Fork Oil Level Gauge: 57001-1290
Vacuum Gauge: 57001-1369
Sensor Harness Adapter: 57001-1561

Inlet Air Pressure Sensor Output Voltage
Connections to Adapter
Meter (+) → G/W (sensor G/Y) lead
Meter (–) → BK (sensor BR/BK) lead



- Turn the ignition switch ON.
- Measure the output voltage from various vacuum readings, while pulling the handle of the fork oil level gauge.

★If the output voltage for various vacuum is normal, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).
- Check the output voltage, using the following formula and chart.

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Inlet Air Pressure Sensor (Service Code 12)

Suppose:
Pg: Vacuum Pressure (gauge) to Sensor
Pl: Local Atmospheric Pressure (absolute) measured by a barometer
Pv: Vacuum Pressure (absolute) to Sensor
Vv: Sensor Output Voltage (V)

then
Pv = Pl – Pg

For example, suppose the following data is obtained:
Pg = 8 cmHg (Vacuum gauge reading)
Pl = 70 cmHg (Barometer reading)
Vv = 3.2 V (Digital meter reading)

then
Pv = 70 – 8 = 62 cmHg (Abs.)

Plot this Pv (62 cmHg) at a point [1] on the chart and draw a vertical line through the point. Then, you can get the usable range [2] of the sensor output voltage.
Usable range = 3.04 ~ 3.49 V
Plot Vv (3.2 V) on the vertical line. → Point [3].
Results: In the chart, Vv is within the usable range and the sensor is normal.
★If the reading is out of the usable range, replace the sensor.
★If the reading is within the usable range, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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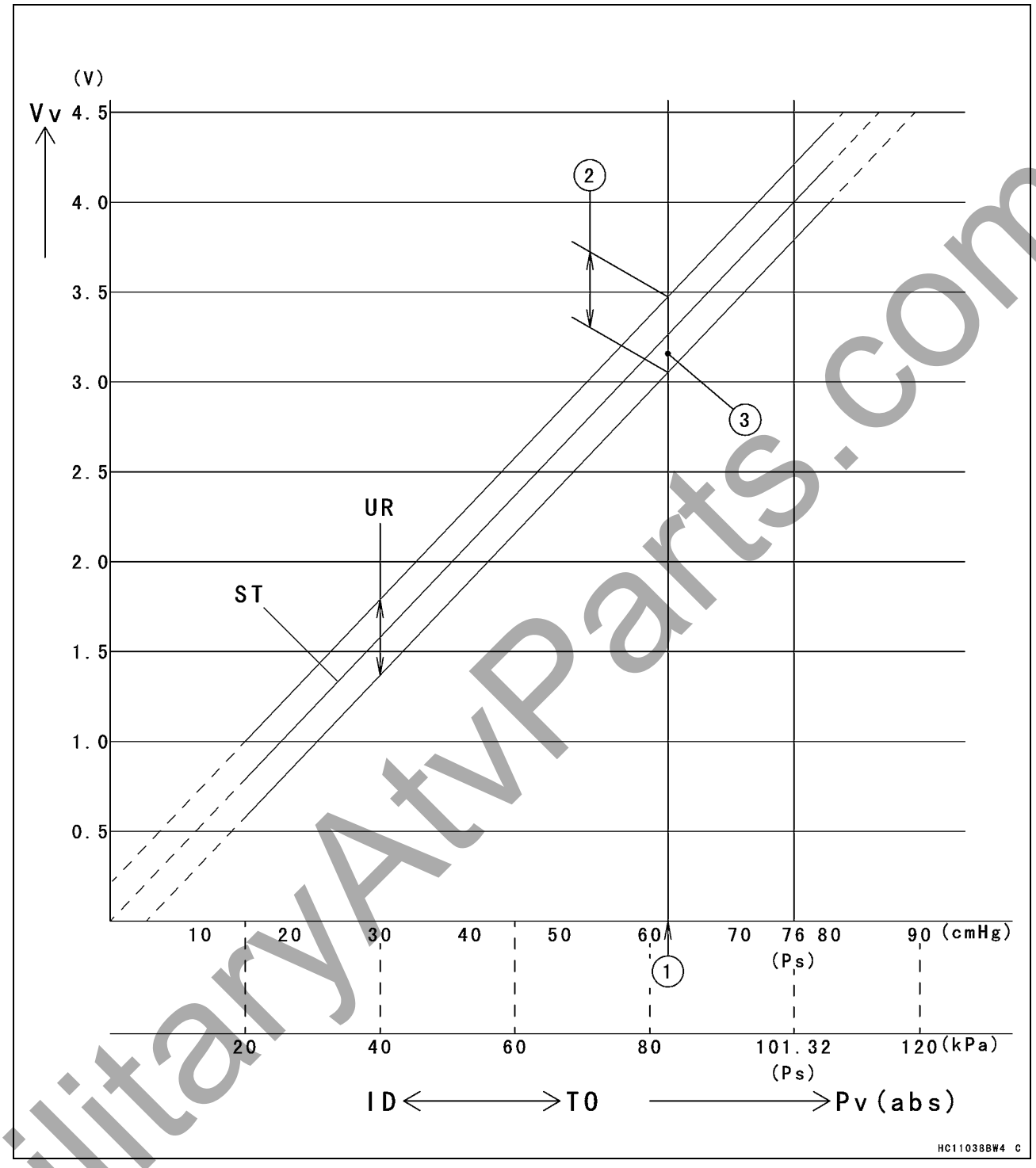
Inlet Air Pressure Sensor (Service Code 12)



ID: Idling
Ps: Standard Atmospheric Pressure (Absolute)
Pv: Throttle Vacuum Pressure (Absolute)
ST: Standard of Sensor Output Voltage (V)
TO: Throttle Full Open
UR: Usable Range of Sensor Output Voltage (V)
Vv: Inlet Air Pressure Sensor Output Voltage (V) (Digital Meter Reading)

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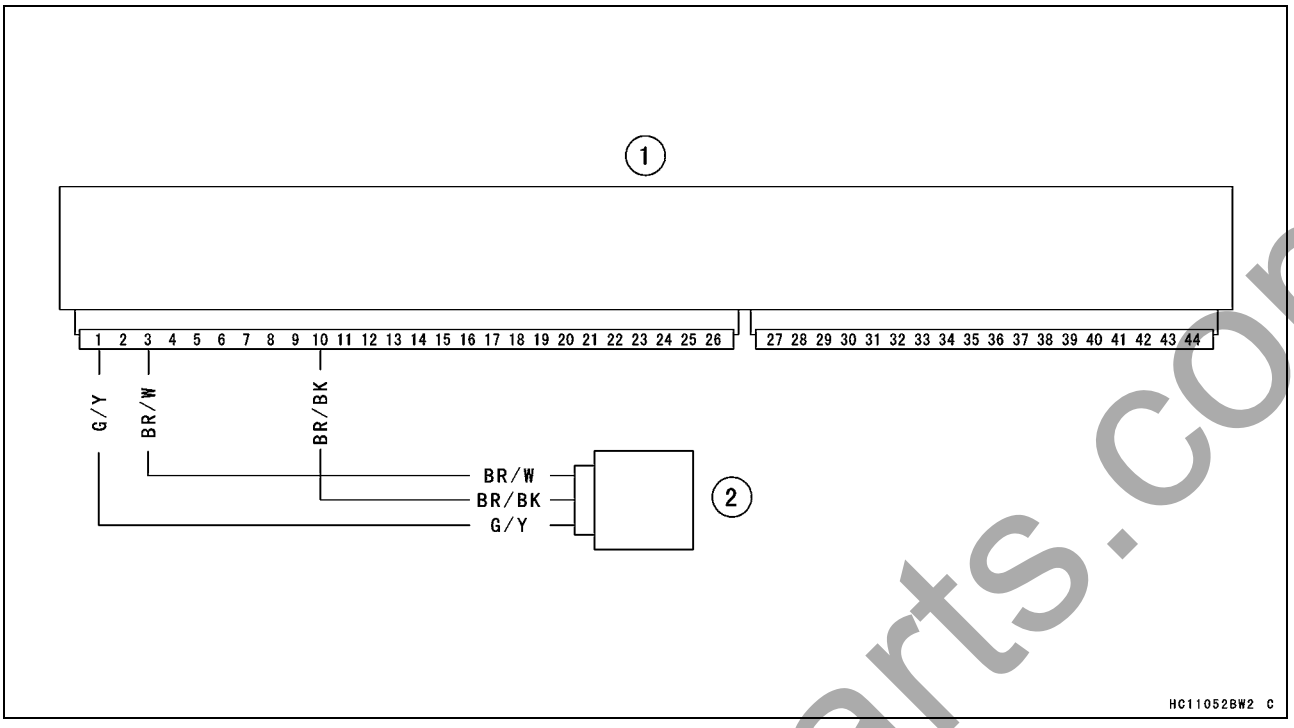
Inlet Air Pressure Sensor (Service Code 12)

Inlet Air Pressure Sensor Circuit



1. ECU (Electronic Control Unit)
2. Inlet Air Pressure Sensor

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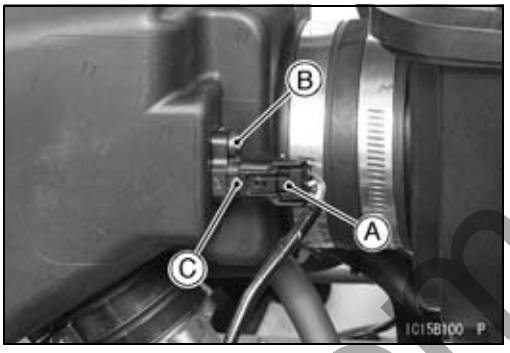
Inlet Air Temperature Sensor (Service Code 13)

Inlet Air Temperature Sensor Removal/Installation



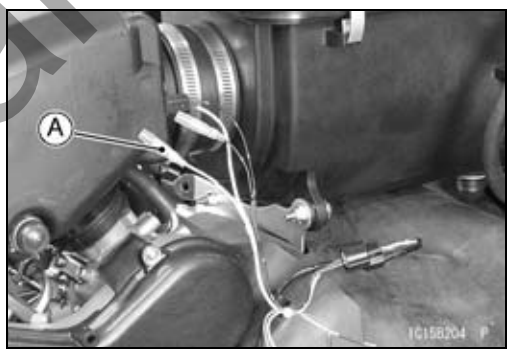
NOTICE

Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.

- Remove:
  Inlet Air Temperature Sensor Connector [A]
  Screw [B]
  Inlet Air Temperature Sensor [C]

- Install a new O-ring [A].
- Put the inlet air temperature sensor into the air cleaner housing.
- Tighten the screw securely.

Inlet Air Temperature Sensor Output Voltage Inspection



NOTE

○*Be sure the battery is fully charged.*
○*The output voltage changes according to the inlet air temperature.*

- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Disconnect the inlet air temperature sensor connector and connect the measuring adapter [A] between these connectors.

  Special Tool - Measuring Adapter: 57001-1700
- Connect a digital meter to the measuring adapter leads.

  Connections to adapter:
  Meter (+) → Y lead of Main Harness
  Meter (–) → BR/BK lead of Main Harness
- Measure the output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.

  Inlet Air Temperature Sensor Output Voltage
  Standard: About 2.25 ~ 2.50 V at inlet air temperature 20°C (68°F)
- Turn the ignition switch OFF.

★If the output voltage is out of the standard, check the wiring for continuity (see Inlet Air Temperature Sensor Circuit).

★If the wiring is good, check the sensor resistance (see Inlet Air Temperature Sensor Resistance).

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Inlet Air Temperature Sensor (Service Code 13)

★If the output voltage is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Inlet Air Temperature Sensor Resistance Inspection

- Remove the inlet air temperature sensor (see Inlet Air Temperature Sensor Removal/Installation).
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion is submerged.
- Suspend a thermometer [B] with the heat-sensitive portions [C] located in almost the same depth with the sensor.

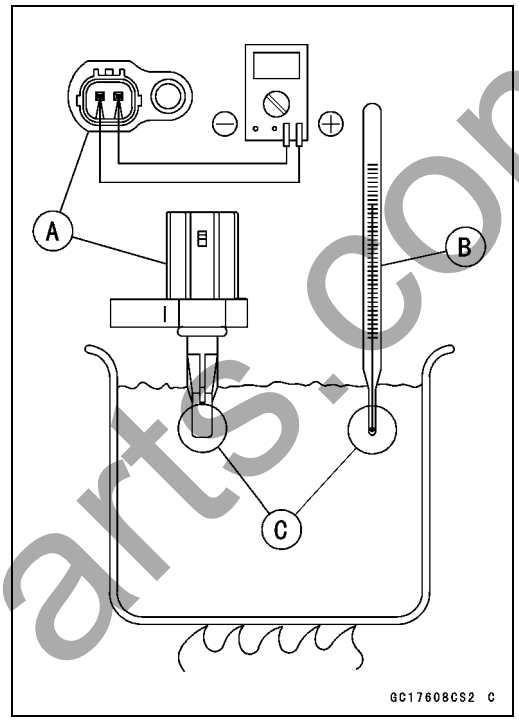
NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using a digital meter, measure the internal resistance of the sensor across the terminals at the temperatures shown in the following.

Inlet Air Temperature Sensor Resistance
Standard: 5.4 ~ 6.6 kΩ at 0°C (32°F)
0.29 ~ 0.39 kΩ at 80°C (176°F)

★If the measurement is out of the standard, replace the sensor.
★If the measurement is within the specified, replace the ECU (see ECU Removal/Installation).



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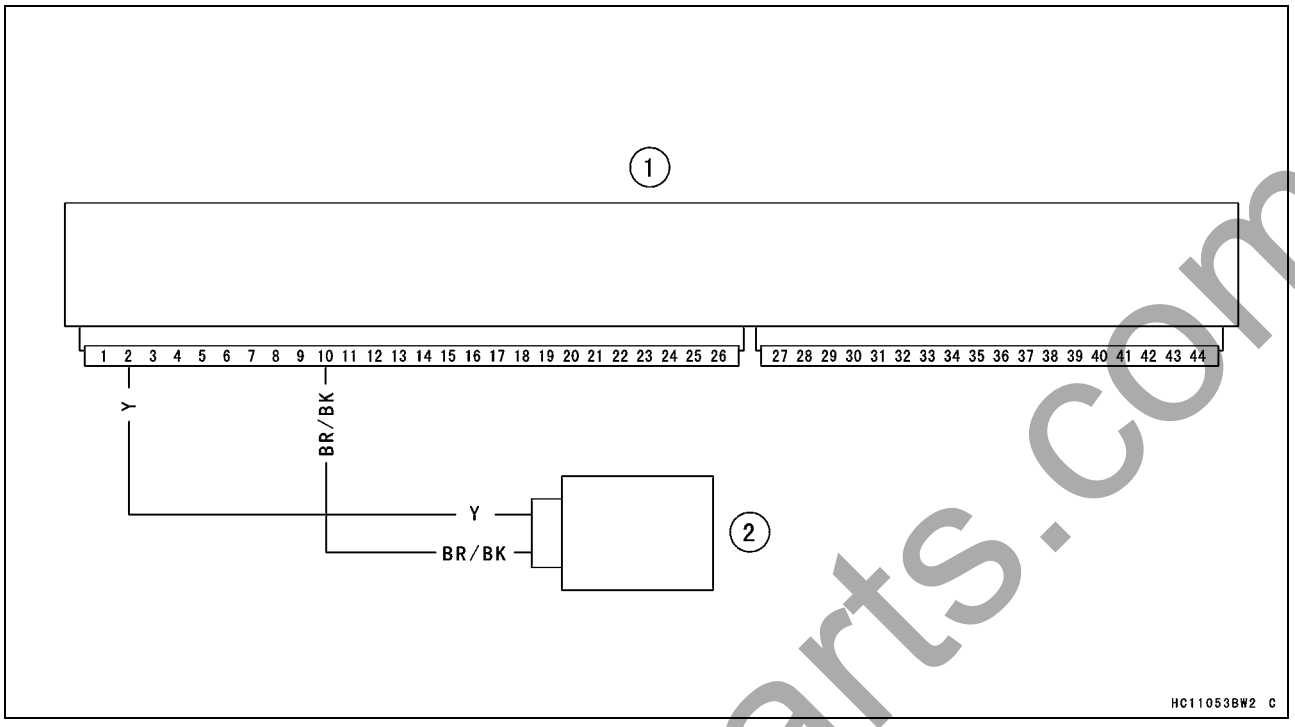
Inlet Air Temperature Sensor (Service Code 13)

Inlet Air Temperature Sensor Circuit



1. ECU (Electronic Control Unit)
2. Inlet Air Temperature Sensor

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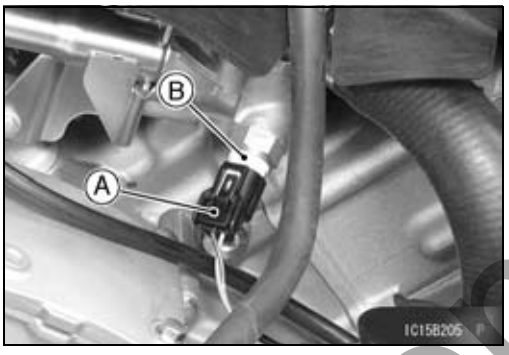
Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Removal

NOTICE

Never drop the sensor, especially on a hard surface. Such a shock to the sensor can damage it.



- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Disconnect the switch lead connector [A].
- Remove the water temperature sensor [B].

Water Temperature Sensor Installation

- Apply grease to new O-ring on the water temperature sensor.
- Tighten:

  Torque - Water Temperature Sensor: 12 N·m (1.2 kgf·m, 106 in·lb)

- Fill the engine with coolant and bleed the air from the cooling system (see Coolant Change in the Periodic Maintenance chapter).

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Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*
○*The output voltage changes according to the coolant temperature in the engine.*

- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal)
- Disconnect the water temperature sensor connector and connect the measuring adapter [A] between these connectors.

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the measuring adapter leads.

Connections to Adapter:
Meter (+) → O lead of Main Harness
Meter (–) → BR/BK lead of Main Harness

- Measure the output voltage with the engine stopped and the connector joined.
- Turn the ignition switch ON.

Water Temperature Sensor Output Voltage
Standard: About 2.24 ~ 2.48 V at 20°C (68°F)

- Turn the ignition switch OFF.

★If the output voltage is within the standard, check the ECU for its ground, and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the output voltage is out of the standard, check the wiring for continuity (see Water Temperature Sensor Circuit).
★If the wiring is good, check the water temperature sensor resistance (see Water Temperature Sensor Resistance Inspection).

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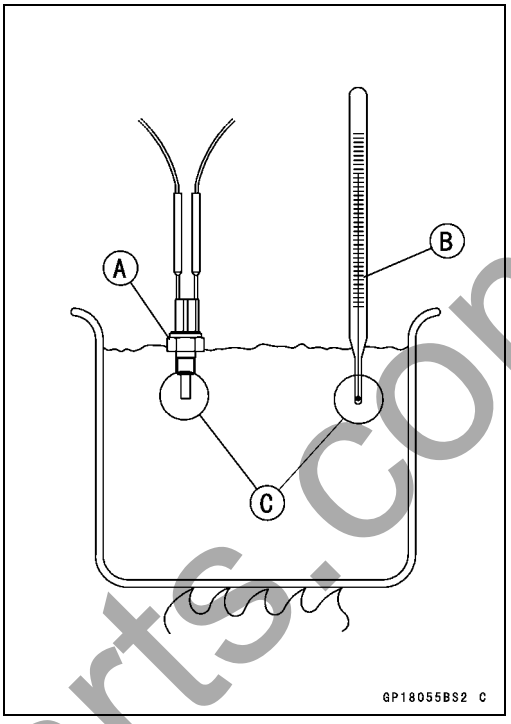
Water Temperature Sensor (Service Code 14)

Water Temperature Sensor Resistance Inspection



- Remove the water temperature sensor (see Water Temperature Sensor Removal/Installation).
- Suspend the sensor [A] in a container of machine oil so that the heat-sensitive portion and threaded portion are submerged.
- Suspend an accurate thermometer [B] with heat-sensitive portions [C] located in almost the same depth.

NOTE

○*The sensor and thermometer must not touch the container side or bottom.*

- Place the container over a source of heat and gradually raise the temperature of the oil while stirring the oil gently for even temperature.
- Using the hand tester, measure the internal resistance of the sensor across the terminal and the body at the temperatures shown in the table.

★If the measurement is out of the range, replace the sensor.

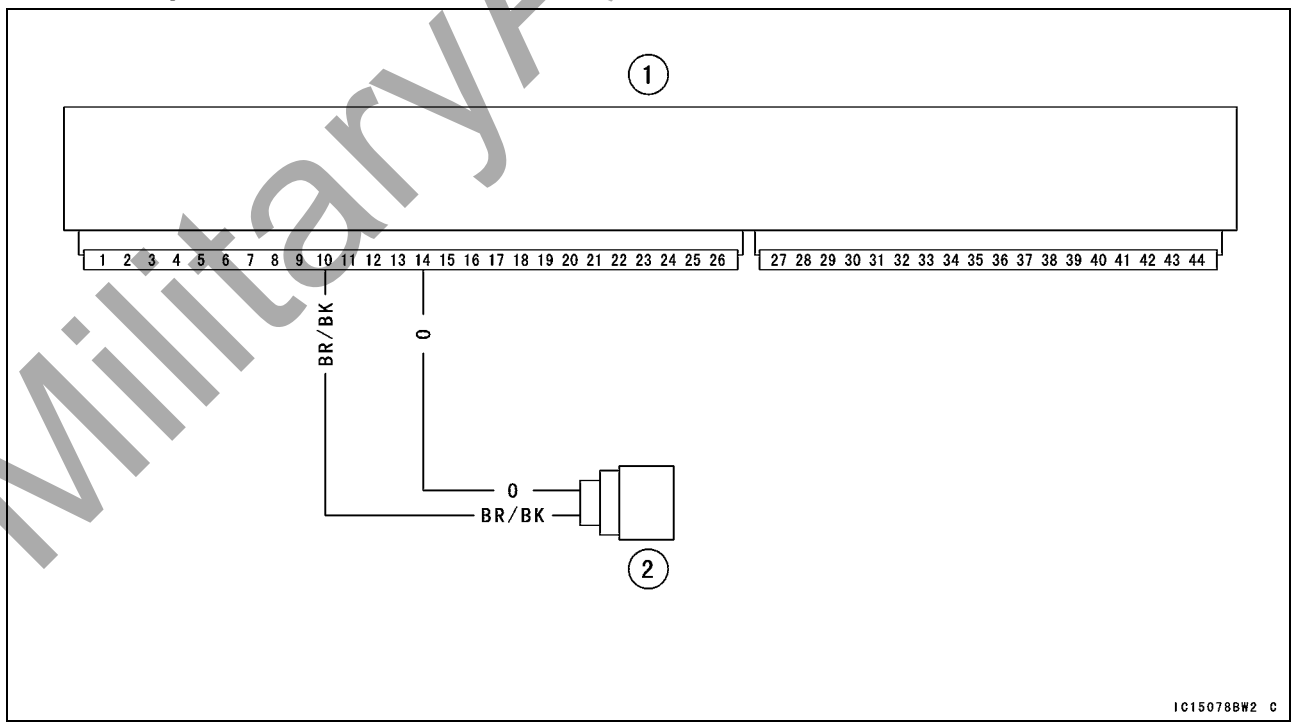
Water Temperature Sensor Resistance

Temperature	Resistance (kΩ)
−20°C (−4°F)	*18.80 ±2.37
0°C (32°F)	*(about 6.544)
40°C (104°F)	1.136 ±0.095
100°C (212°F)	0.1553 ±0.0070

*: Reference Information

★If the resistance is within the standard, replace the ECU (see ECU Removal/Installation).

Water Temperature Sensor Circuit



1. ECU (Electronic Control Unit)
2. Water Temperature Sensor

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Crankshaft Sensor (Service Code 21)

Crankshaft Sensor Removal/Installation

- Refer to the Crankshaft Sensor Removal/Installation in the Electrical System chapter.

Crankshaft Sensor Inspection

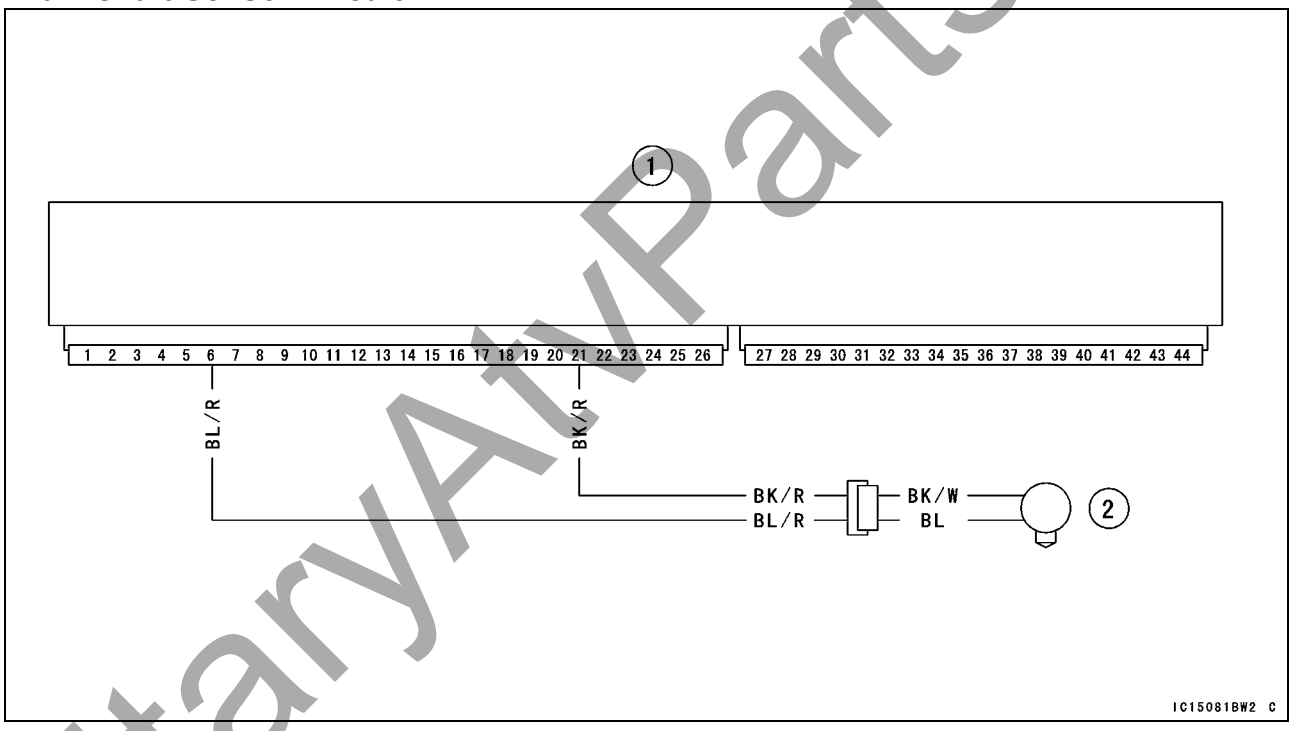
○The crankshaft sensor has no power source, and when the engine stops, the crankshaft sensor generates no signals.

- Refer to the Crankshaft Sensor Inspection in the Electrical System.
- Check the wiring for continuity (see Crankshaft Sensor Circuit).

★If the crankshaft sensor and the wiring are good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Crankshaft Sensor Circuit



1. ECU (Electronic Control Unit)
2. Crankshaft Sensor

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Speed Sensor (Service Code 24)

Speed Sensor Removal

- Refer to the Speed Sensor Removal in the Electrical System chapter.

Speed Sensor Installation

- Refer to the Speed Sensor Installation in the Electrical System chapter.

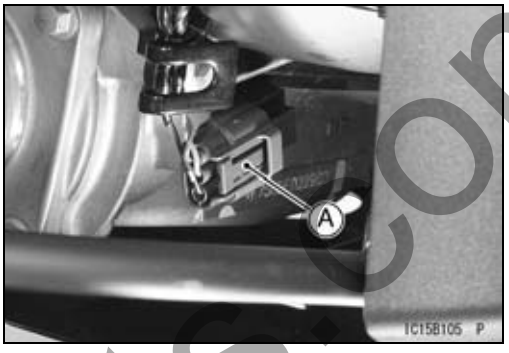
Speed Sensor Input Voltage Inspection

- Remove:
  Right Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Disconnect the speed sensor connector [A].

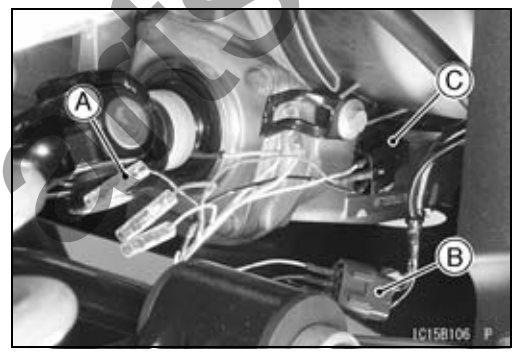


- Connect the measuring adapter [A] between the harness connector [B] and speed sensor [C].

Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the measuring adapter leads.

Connections to Adapter:
Meter (+) → BR lead of Main Harness
Meter (−) → BK/Y lead of Main Harness



- Measure the input voltage with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.

Speed Sensor Input Voltage
Standard: Battery Voltage

- Turn the ignition switch OFF.

★If the reading is good, check the output voltage (see Speed Sensor Output Voltage Inspection).
★If the reading is out of the range, check the wiring for continuity (see Speed Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Speed Sensor Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Using the jack, raise the rear wheel off the ground.

Special Tool - Jack: 57001-1238

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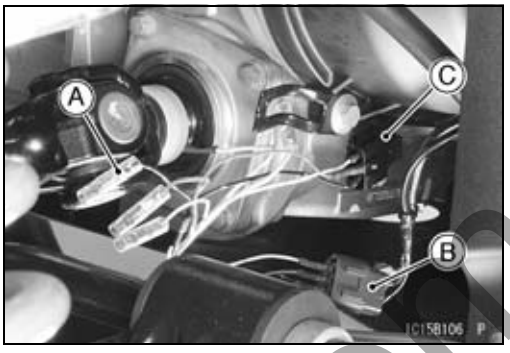
Speed Sensor (Service Code 24)



- Disconnect the speed sensor connector and connect the measuring adapter [A] between the harness connector [B] and speed sensor [C].

  Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the measuring adapter leads.

  Connections to Adapter:
  Meter (+) → P lead of Main Harness
  Meter (–) → BK/Y lead of Main Harness

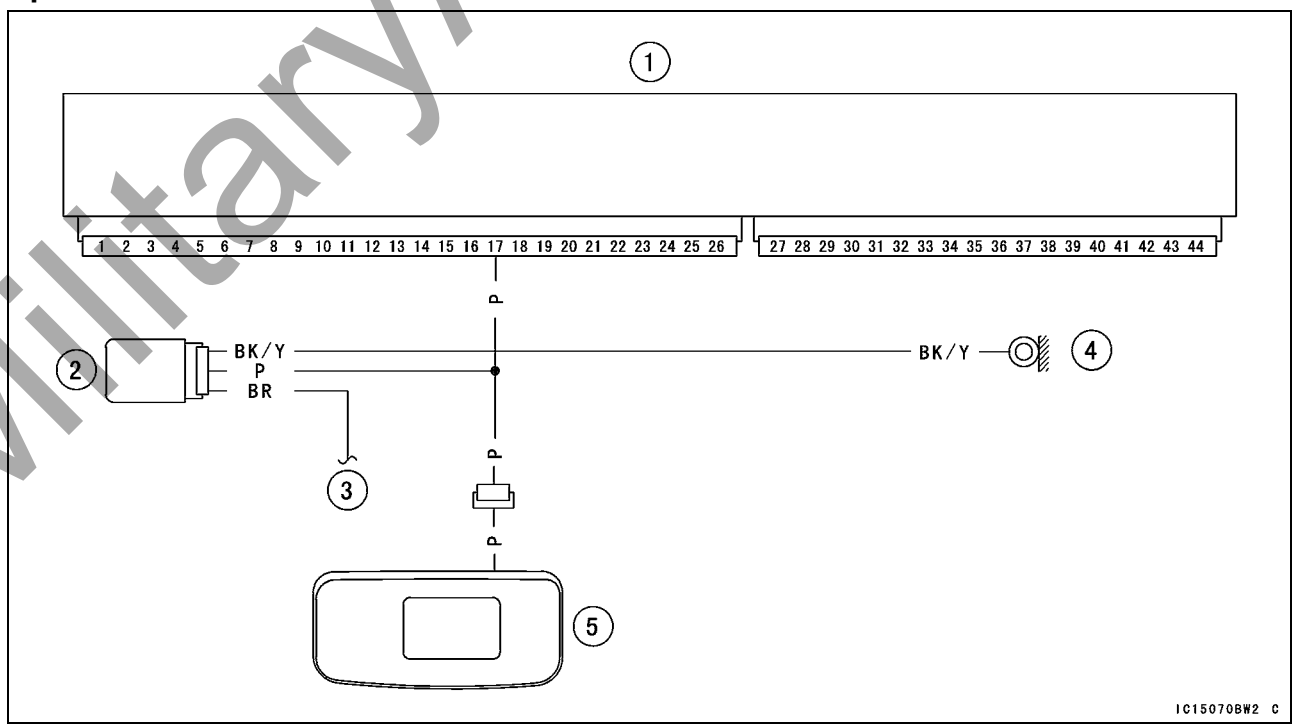
- Measure the output voltage with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.
- Rotate the rear wheel by hand, and confirm whether the output voltage rises or lowers.

  Speed Sensor Output Voltage
  Standard: less than DC 0.8 V or over than DC 4.8 V

- Turn the ignition switch OFF.

★If the reading is out of the standard, replace the sensor.
★If the reading is within the standard, check the wiring for continuity (see Speed Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Speed Sensor Circuit



1. ECU (Electronic Control Unit)
2. Speed Sensor
3. Power Source
4. Frame Ground 1
5. Multifunction Meter

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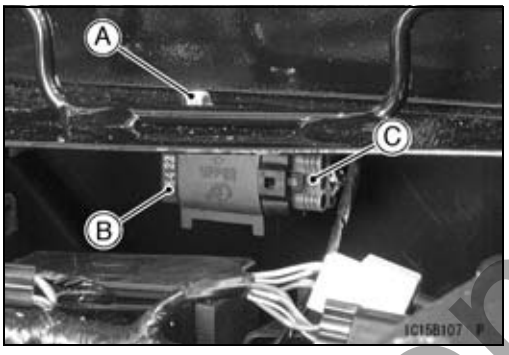
Vehicle-down Sensor (Service Code 31)

Vehicle-down Sensor Removal

NOTICE

Never drop the vehicle-down sensor, especially on a hard surface. Such a shock to the sensor can damage it.



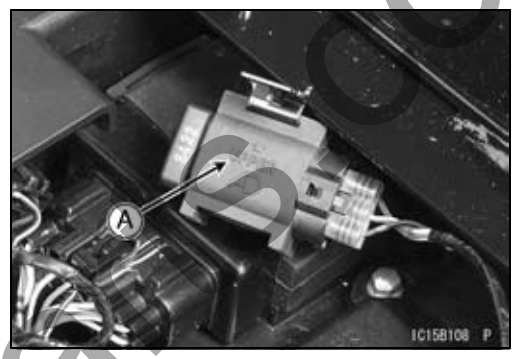
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Bolt [A]
  Vehicle-down Sensor [B]
  Connector [C]

Vehicle-down Sensor Installation

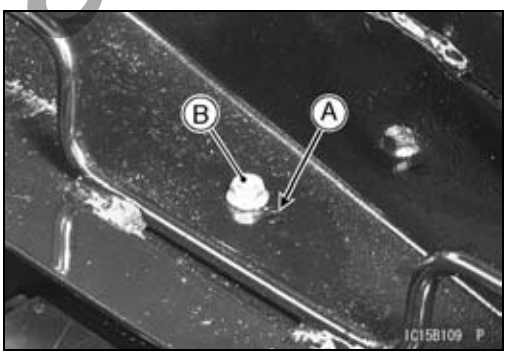
- The UPPER mark [A] of the sensor should face upward.

⚠ WARNING

Incorrect installation of the vehicle-down sensor could cause sudden loss of engine power. The rider could lose balance during certain riding situations like leaning over in a turn with the potential for an accident resulting in injury or death. Ensure that the vehicle-down sensor is held in place by the sensor brackets.



- Insert the projection [A] of the bracket into the hole of the frame.
- Tighten the bolt [B] securely.



Vehicle-down Sensor Input Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Vehicle-down Sensor (see Vehicle-down Sensor Removal)

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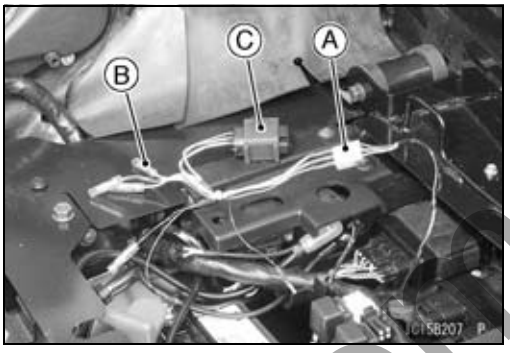
Vehicle-down Sensor (Service Code 31)



- Disconnect the vehicle-down sensor connector [A] and connect the measuring adapter [B] between the main harness connector and vehicle-down sensor [C].

  Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the measuring adapter leads.

  Connections to Adapter:
  Meter (+) → BR/W lead of Main Harness
  Meter (–) → BR/BK lead of Main Harness

- Install the vehicle-down sensor temporarily.
- Measure the input voltage with the engine stopped and with the connectors joined.
- Turn the ignition switch ON.

  Vehicle-down Sensor Input Voltage
  Standard: DC 4.75 ~ 5.25 V

- Turn the ignition switch OFF.

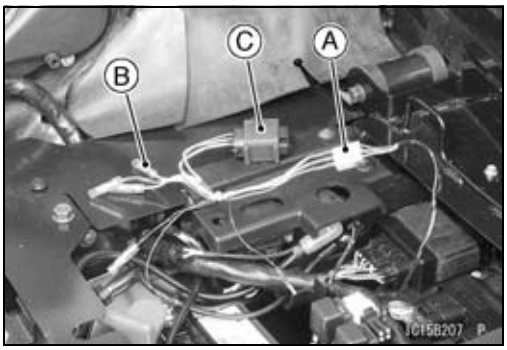
★If the reading is good, check the output voltage (see Vehicle-down Sensor Output Voltage Inspection).
★If the reading is out of the range, check the wiring for continuity (see Vehicle-down Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Vehicle-down Sensor Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove the vehicle-down sensor (see Vehicle-down Sensor Removal).



- Disconnect the vehicle-down sensor connector [A] and connect the measuring adapter [B] between the main harness connector and vehicle-down sensor [C].

  Special Tool - Measuring Adapter: 57001-1700

- Connect a digital meter to the measuring adapter leads.

  Connections to Adapter:
  Meter (+) → Y/G lead of Main Harness
  Meter (–) → BR/BK lead of Main Harness

- Hold the sensor vertically.
- Measure the output voltage with the engine stopped, and with the connectors joined.

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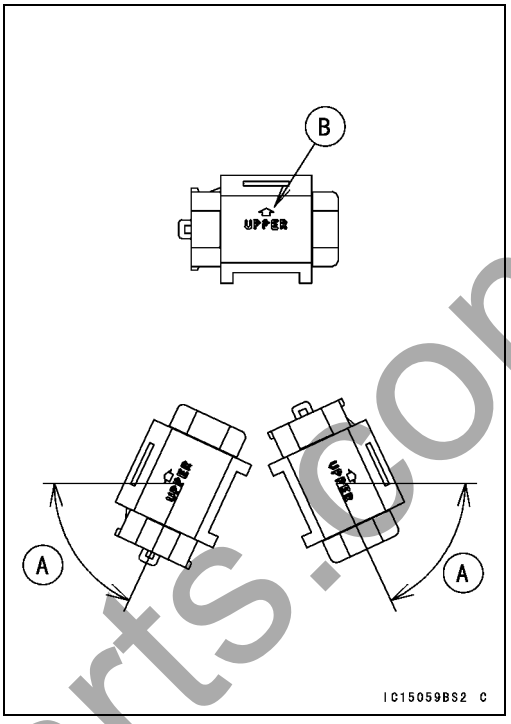
Vehicle-down Sensor (Service Code 31)

- Turn the ignition switch ON.
- Tilt the sensor 55 ~ 75° or more [A] right or left, then hold the sensor almost vertical with the arrow mark [B] pointed up, and measure the output voltage.

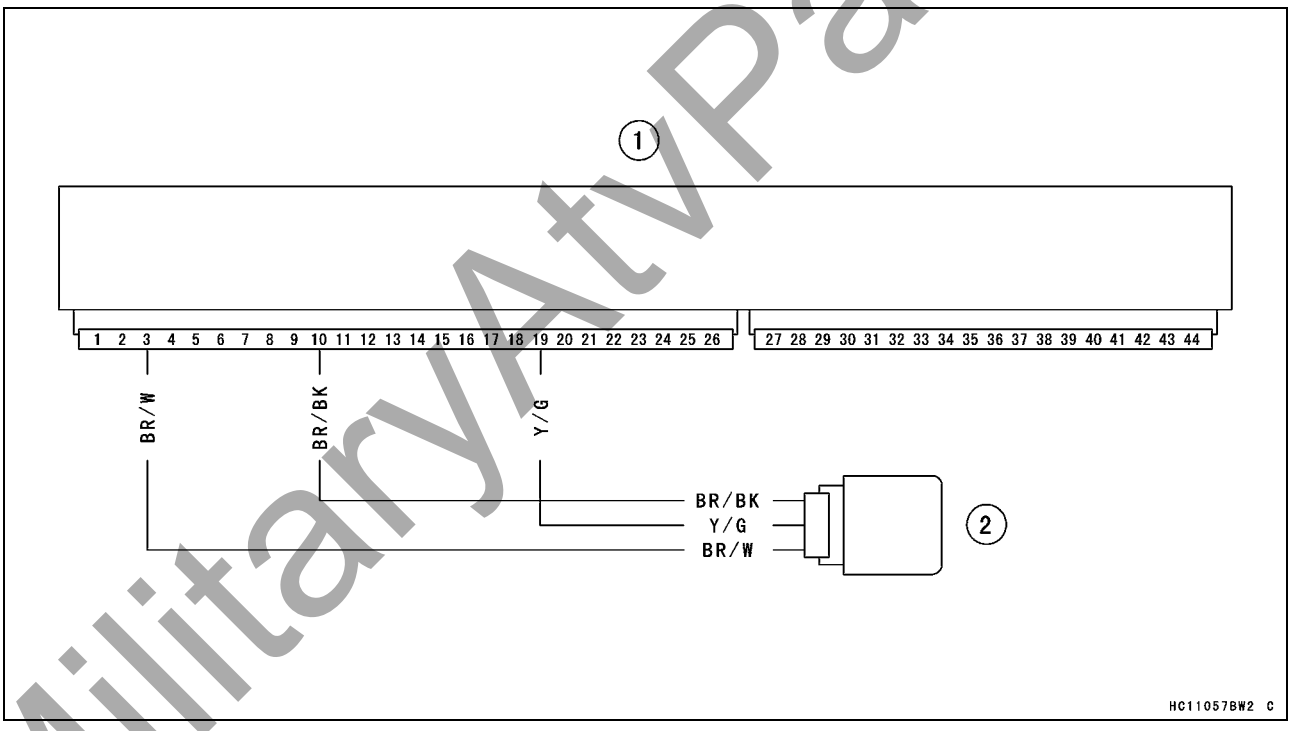
Vehicle-down Sensor Output Voltage
Standard: with sensor arrow mark pointed up: DC 0.4 ~ 1.4 V
with sensor tilted 55~ 75° or more right or left: DC 3.7 ~ 4.4 V

- Turn the ignition switch OFF.

★If the reading is out of the standard, replace the vehicle -down sensor.
★If the reading is within the standard, check the wiring for continuity (see Vehicle-down Sensor Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).



Vehicle-down Sensor Circuit



1. ECU (Electronic Control Unit)
2. Vehicle-down Sensor

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Fuel Pump Relay (Service Code 46)

Fuel Pump Relay Removal

- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Fuel Pump Relay [A]

Fuel Pump Relay Inspection

- Refer to the Relay Inspection in the Electrical System chapter.

★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Relay Circuit).

Special Tool - Hand Tester: 57001-1394

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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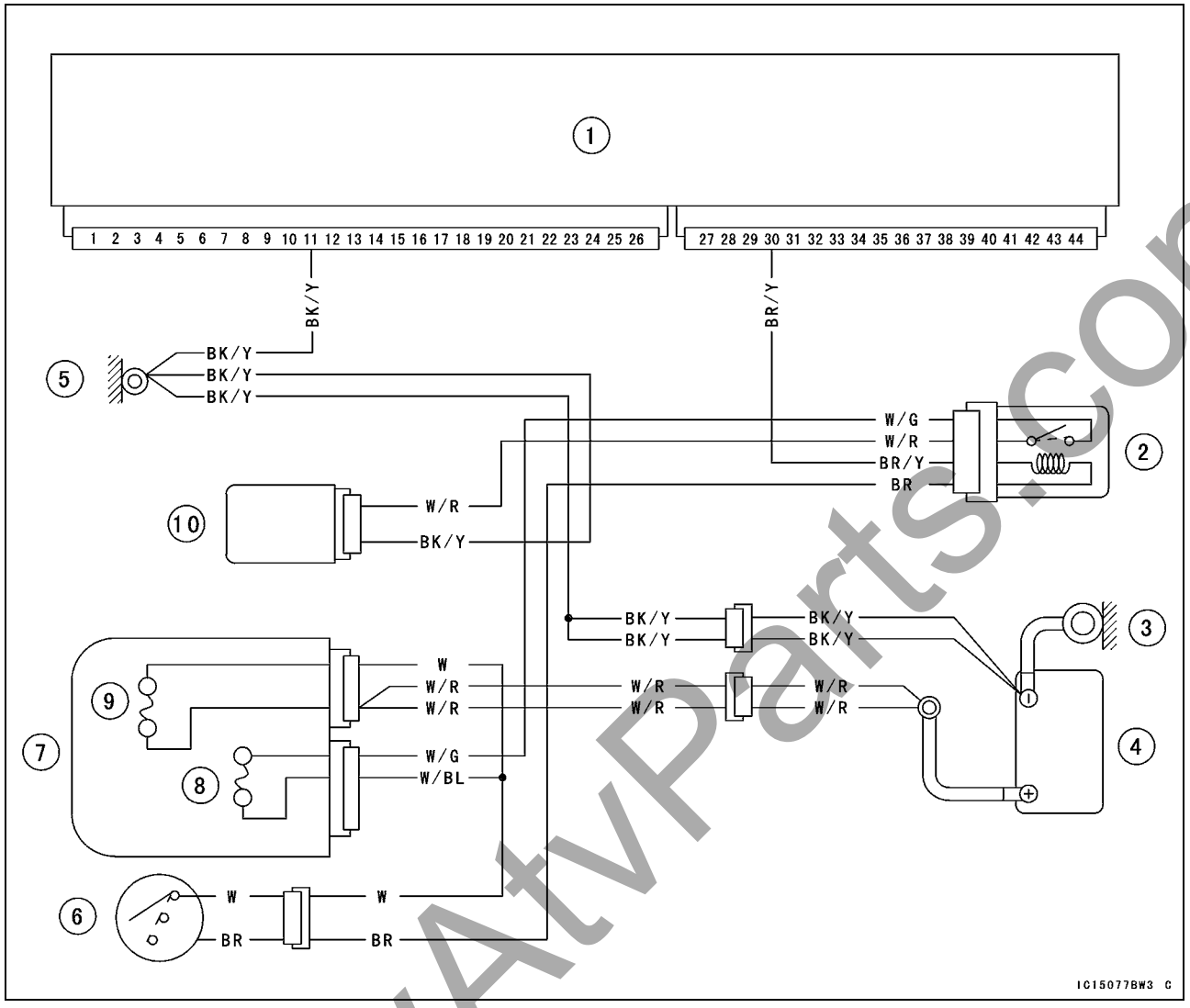
Fuel Pump Relay (Service Code 46)

Fuel Pump Relay Circuit



1. ECU (Electronic Control Unit)
2. Fuel Pump Relay
3. Engine Ground
4. Battery
5. Frame Ground 1
6. Ignition Switch
7. Fuse Box
8. Fuel Pump Fuse 10 A
9. Main Fuse 30 A
10. Fuel Pump

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Ignition Coils (#1, #2: Service Code 51, 52)

Ignition Coil #1: Ignition Coil for Front Cylinder (Service Code 51)
Ignition Coil #2: Ignition Coil for Rear Cylinder (Service Code 52)

Ignition Coil Removal/Installation

NOTICE

Never drop the ignition coils, especially on a hard surface. Such a shock to the ignition coil can damage it.

- Refer to the Ignition Coil Removal and Installation in the Electrical System chapter.

Ignition Coil Winding Resistance

- Refer to the Ignition Coil Inspection in the Electrical System chapter.

★If the resistance is within the standard, check the input voltage (see Ignition Coil Input Voltage Inspection).

Ignition Coil Input Voltage Inspection

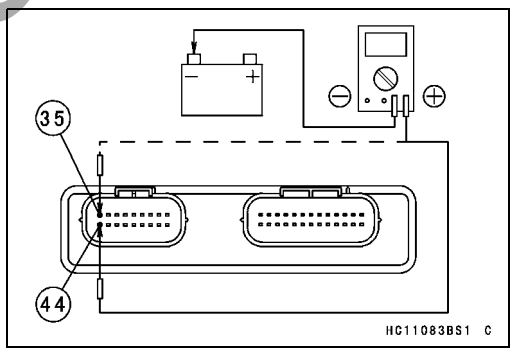
NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
- Connect a digital voltmeter as shown, using two needle adapters.

Special Tool - Needle Adapter Set: 57001-1457

Connections for Ignition Coil #1 (Front)
Meter (+) → G/W lead (terminal 44)
Meter (–) → Battery (–) Terminal
Connections for Ignition Coil #2 (Rear)
Meter (+) → BL/W lead (terminal 35)
Meter (–) → Battery (–) Terminal



- Measure the input voltage to each primary winding of the ignition coils with the engine stopped, and with the connectors joined.
- Turn the ignition switch ON.

Ignition Coil Input Voltage
Standard: 12 V or more

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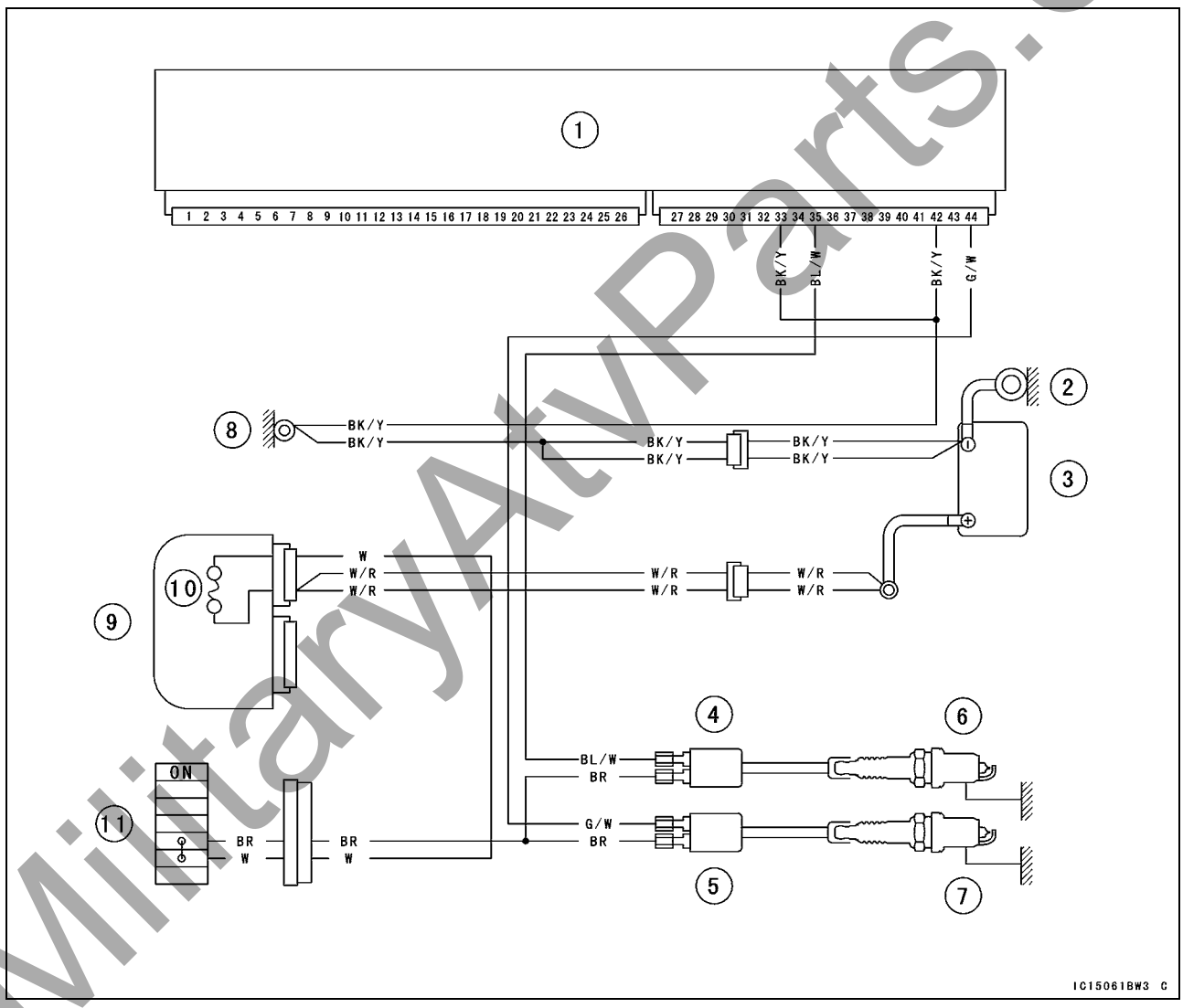
Ignition Coils (#1, #2: Service Code 51, 52)

● Turn the ignition switch OFF.
★If the input voltage is out of the standard, check the wiring for continuity (see Ignition Coil Circuit).

Special Tool - Hand Tester: 57001-1394

★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the input voltage is within the standard, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Ignition Coil Circuit



1. ECU (Electronic Control Unit)
2. Engine Ground
3. Battery
4. Ignition Coil #2 (Rear)
5. Ignition Coil #1 (Front)
6. Spark Plug (Rear)
7. Spark Plug (Front)
8. Frame Ground 1
9. Fuse Box
10. Main Fuse 30 A
11. Ignition Switch

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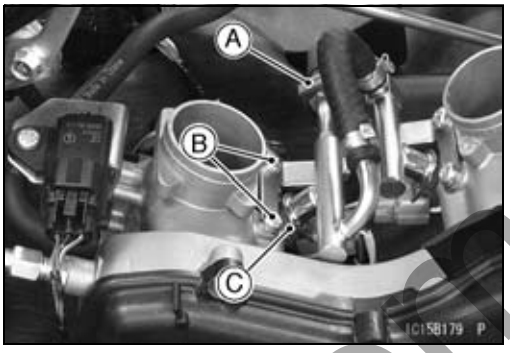
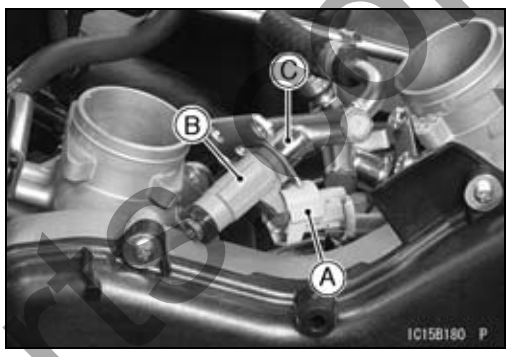
Fuel Injectors

Fuel Injector Removal

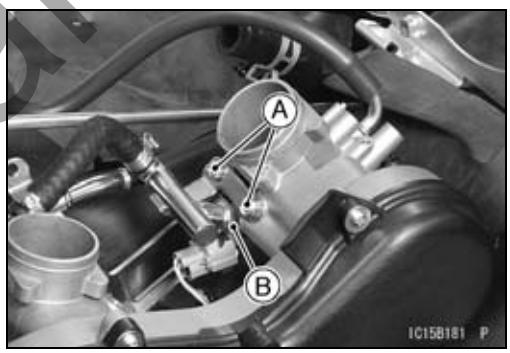
- Remove:
  Air Cleaner Duct (see Air Cleaner Housing and Duct Removal)
  Fuel Hose Joint [A] (see Fuel Hose Replacement)
  Front Delivery Pipe Mounting Screws [B]
- Remove the front fuel injector [C] from the throttle body.



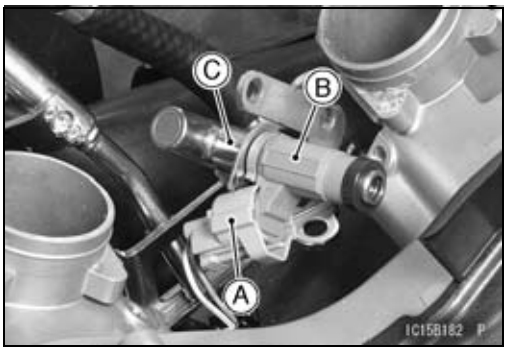
- Disconnect the fuel injector connector [A].
- Remove the front fuel injector [B] from the delivery pipe [C].



- Remove:
  Rear Delivery Pipe Mounting Screws [A]
  Rear Fuel Injector [B]

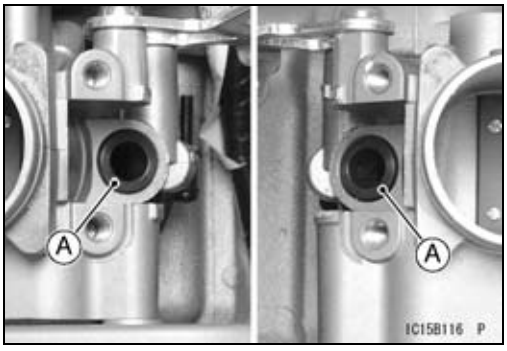


- Disconnect the fuel injector connector [A].
- Remove the rear fuel injector [B] from the delivery pipe [C].



Fuel Injector Installation

- Replace the seals [A] with new ones.



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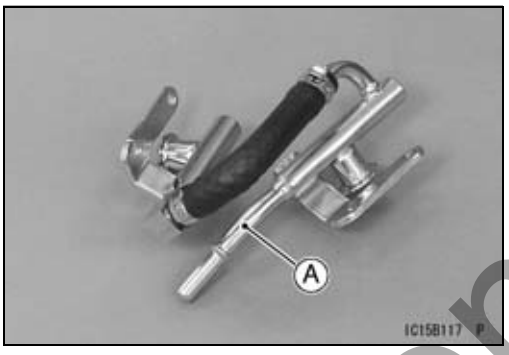
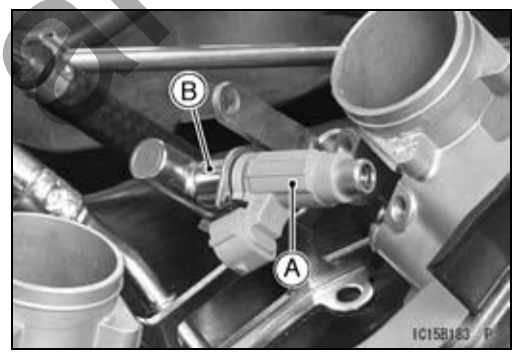
Fuel Injectors

- Before installation, blow away dirt or dust from the delivery pipe [A] by applying compressed air.



- Replace the O-rings [A] with new ones.

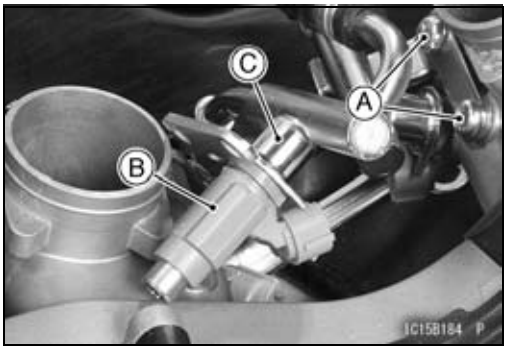
- Install the rear fuel injector [A] into the delivery pipe [B] securely.



- Insert the rear fuel injector into the seal and tighten the rear delivery pipe mounting screws [A].

  Torque - Delivery Pipe Mounting Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)

- Install the front fuel injector [B] into the delivery pipe [C] securely.



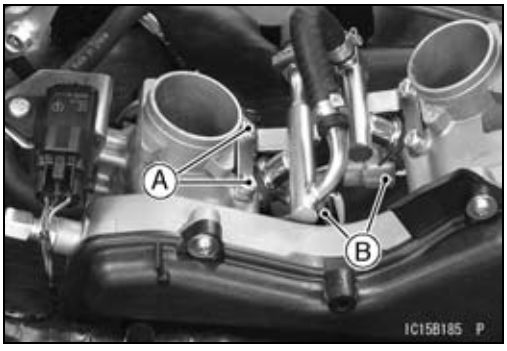
- Insert the front fuel injector into the seal and tighten the front delivery pipe mounting screws [A].

  Torque - Delivery Pipe Mounting Screws: 5.0 N·m (0.51 kgf·m, 44 in·lb)

- Connect the fuel injector connectors [B] as follows.

  BL/R and W/R Leads Connector → Front Fuel Injector

  V and W/R Leads Connector → Rear Fuel Injector



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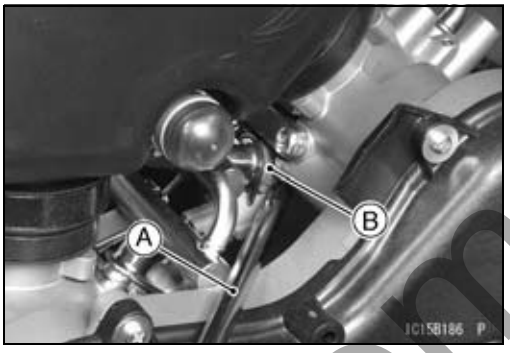
Fuel Injectors

Audible Inspection



- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Start the engine.
- Apply the tip of a screwdriver [A] to the fuel injector [B]. Put the grip end onto your ear, and listen whether the fuel injector is clicking or not.

○A sound scope can also be used.

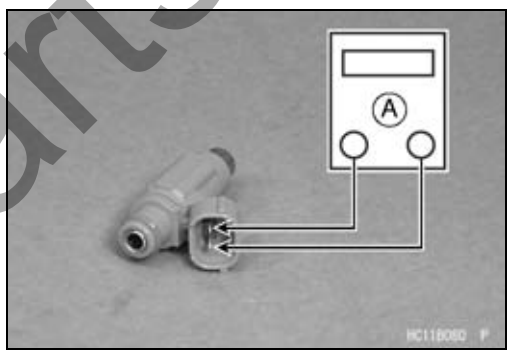
- Do the same for the other fuel injector.

★If all the fuel injectors click at a regular intervals, the fuel injectors are good. The trouble may be related to the fuel line, requiring fuel pressure inspection (see Fuel Pressure Inspection).

○The click interval becomes shorter as the engine speed rises.

★If any fuel injector(s) does not click, check the fuel injector resistance (see Fuel Injector Resistance Inspection).

Fuel Injector Resistance Inspection



- Remove:
  Fuel Injector (see Fuel Injector Removal)
- Connect a digital meter [A] to the terminals in the fuel injector.
- Measure the fuel injector resistance.

Fuel Injector Resistance
Standard: About 11.7 ~ 12.3 Ω at 20°C (68°F)

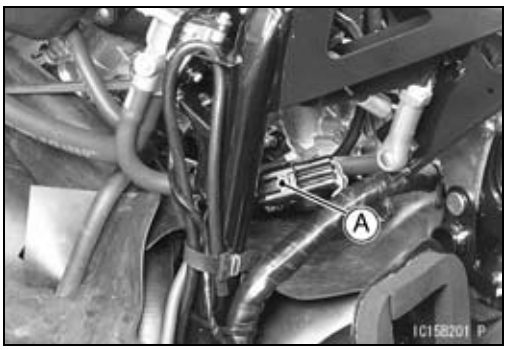
- If the reading is out of the standard, replace the fuel injector.
- If the reading within the standard, check the power source voltage (see Fuel Injector Power Source Voltage Inspection).

Fuel Injector Power Source Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)



- Connect the hand tester to the connector [A] with the needle adapter set.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

Connections:
Meter (+) → W/R lead
Meter (–) → Battery (–) terminal

- Measure the power source voltage with the engine stopped.
- Turn the ignition switch ON.

Fuel Injector Power Source Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch OFF.

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Fuel Injectors

★If the reading stays on battery voltage and never shows 0 V, check the fuel pump relay (see Relay Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If there is still no battery voltage, check the fuel pump relay (see Relay Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the power source wiring (see Fuel Injector Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is in specification, check the output voltage (see Fuel Injector Output Voltage Inspection).

Fuel Injector Output Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Turn the ignition switch OFF.
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)

- Connect the hand tester to the connector [A] with the needle adapter set.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

Connections :
Meter (+) → BL/R lead or V lead
Meter (–) → Battery (–) terminal

- Measure the output voltage with the engine stopped.
- Turn the ignition switch ON.

Fuel Injector Output Voltage
Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch OFF.

★If the reading is in specification, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).
★If the reading is out of the specification, check the wiring for continuity (see Fuel Injector Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

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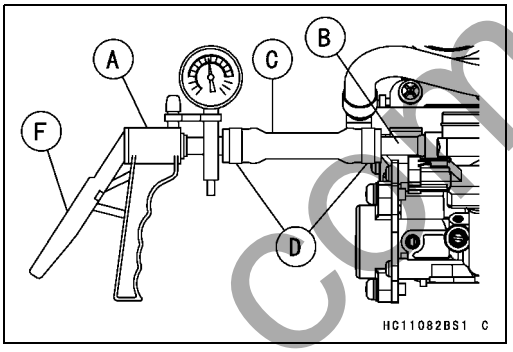
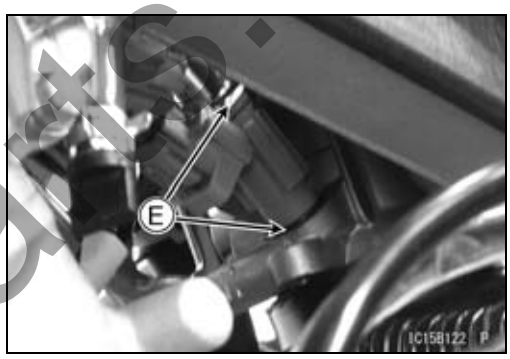
Fuel Injectors

Fuel Injector Fuel Line Inspection

● Remove:
Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
Fuel Hose (see Fuel Hose Replacement)

● Check the injector fuel line for leakage as follows.
○Connect a commercially available vacuum/pressure pump [A] to the delivery pipe [B] with the fuel hose [C] (both ends connected with the clamps [D]) as shown in the figure.
○Apply soap and water solution to the areas [E] as shown in the figure.
○Watching the pressure gauge, squeeze the pump lever [F], and build up the pressure until the pressure reaches the maximum pressure.





Injector Fuel Line Maximum Pressure
Standard: 300 kPa (3.06 kgf/cm², 43 psi)

NOTICE

During pressure testing, do not exceed the maximum pressure for which the system is designed.

○Watch the gauge for at least 6 seconds.
★If the pressure holds steady, the fuel line is good.
★If the pressure drops at once or if bubbles are found in the area, the fuel line is leaking. Replace the delivery pipe assy, injectors and related parts.

● Repeat the leak test, and check the fuel line for no leakage.
● Remove the vacuum/pressure pump, and install the fuel hose (see Fuel Hose Replacement).
● Start the engine and check for fuel leakage.

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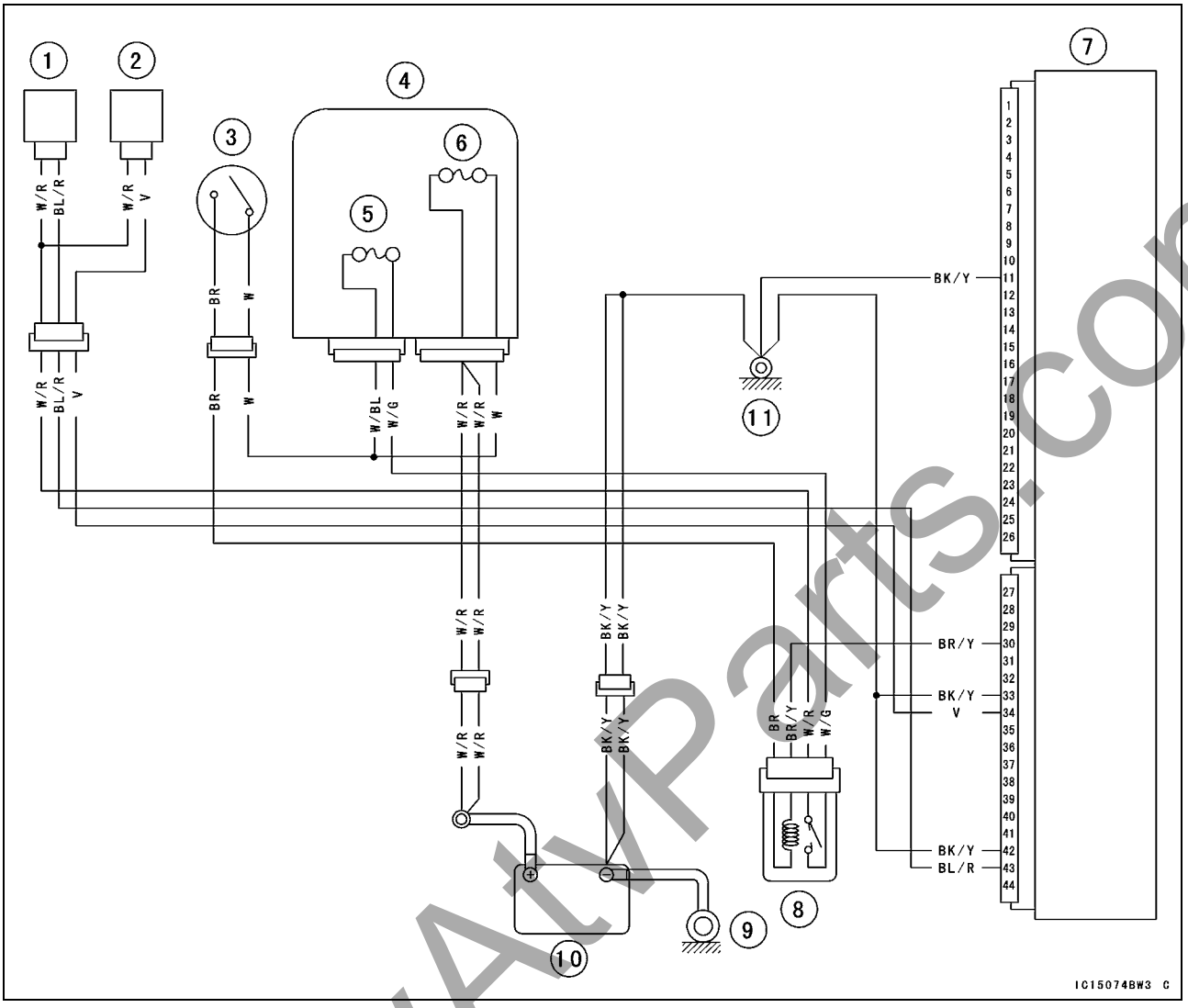
Fuel Injectors

Fuel Injector Circuit



1. Fuel Injector #1
2. Fuel Injector #2
3. Ignition Switch
4. Fuse Box
5. Fuel Pump Fuse 10 A
6. Main Fuse 30 A
7. ECU (Electronic Control Unit)
8. Fuel Pump Relay
9. Engine Ground
10. Battery
11. Frame Ground 1

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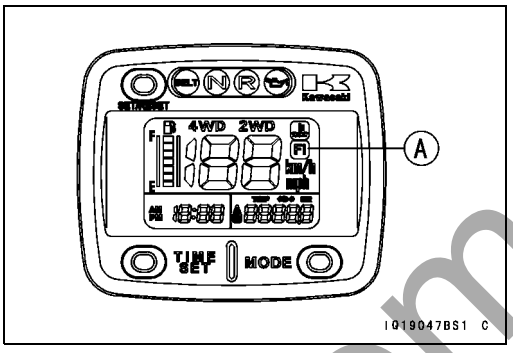
FI Indicator Symbol (LCD)

FI Indicator Symbol (LCD) Inspection

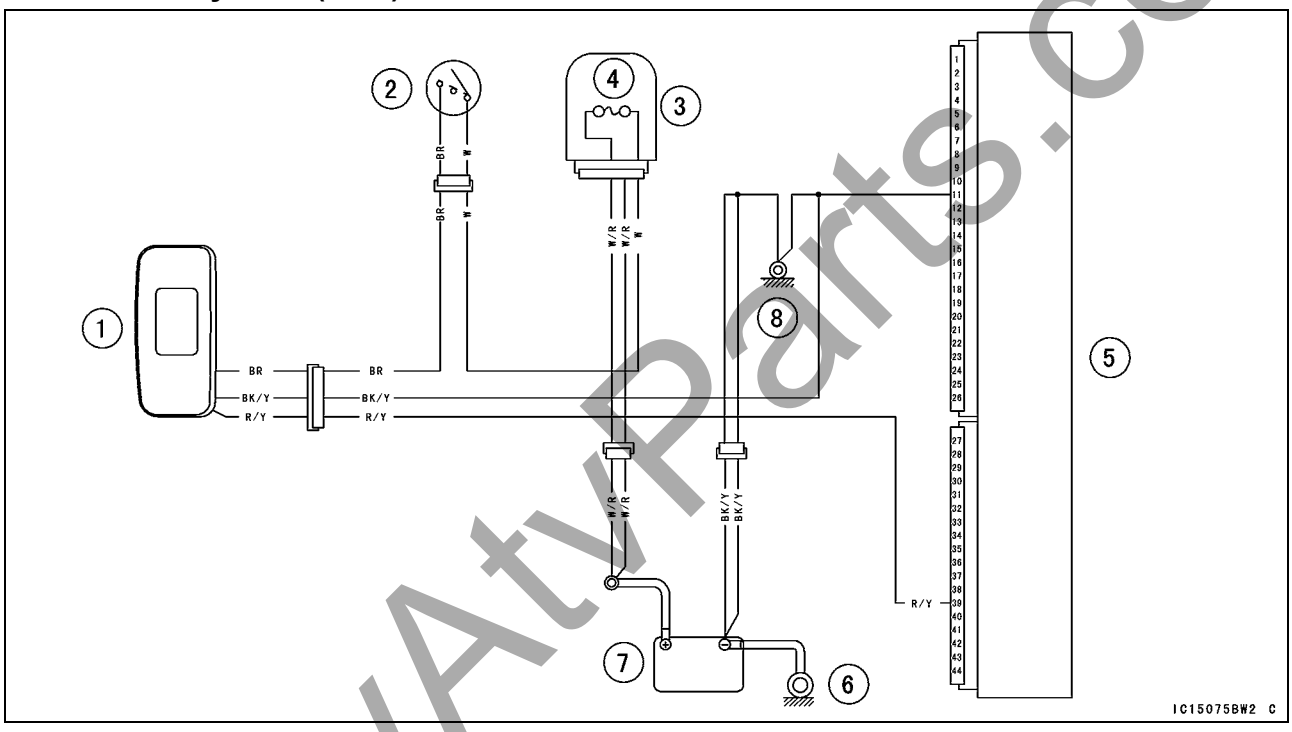


- Refer to the Multifunction Meter Unit Inspection in the Electrical System chapter for FI indicator symbol [A] (LCD) Inspection.

★If the FI indicator symbol (LCD) is abnormal, replace the meter unit.

★If the FI indicator symbol (LCD) is normal, the wiring or ECU has trouble. Check the wiring (see FI Indicator Symbol (LCD) Circuit). If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).

FI Indicator Symbol (LCD) Circuit



1. Multifunction Meter
2. Ignition Switch
3. Fuse Box
4. Main Fuse 30 A
5. ECU (Electronic Control Unit)
6. Engine Ground
7. Battery
8. Frame Ground 1

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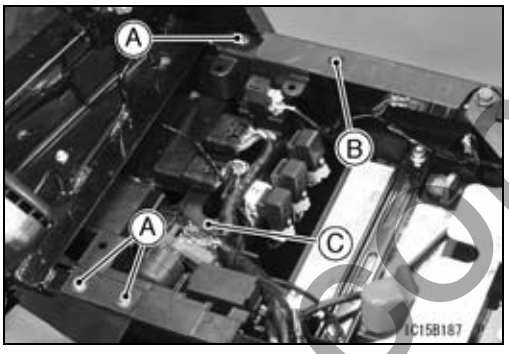
ECU

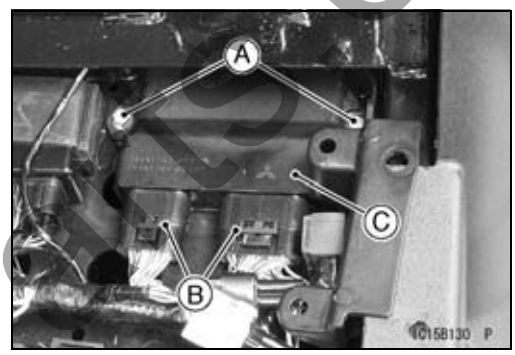
NOTICE

Never drop the ECU, especially on a hard surface. Such a shock to the ECU can damage it.

ECU Removal



- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Screws [A]
  Quick Rivet [B]
- Pull out the electrical parts case [C].



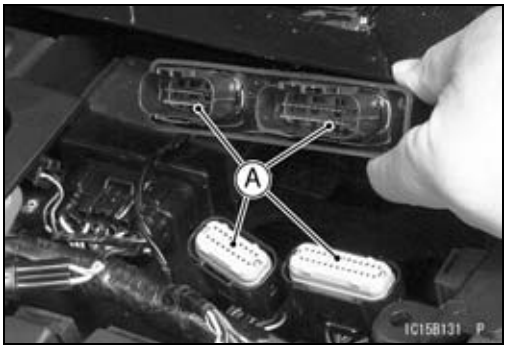
- Remove:
  ECU Mounting Bolts [A]
  Connectors [B]
  ECU [C]

ECU Installation

- Connect the ECU connectors to the ECU.
- Install the ECU to the electrical parts case.
- Tighten:

Torque - ECU Mounting Bolts: 6.9 N·m (0.70 kgf·m, 61 in·lb)

ECU Power Supply Inspection



- Visually inspect the ECU connectors.

★If the connector is clogged with mud or dust, blow it off with compressed air.

- Visually inspect the terminals [A] of the ECU connectors.

★If the terminals of the main harness connectors are damaged, replace the main harness.

★If the terminals of the ECU connectors are damaged, replace the ECU.

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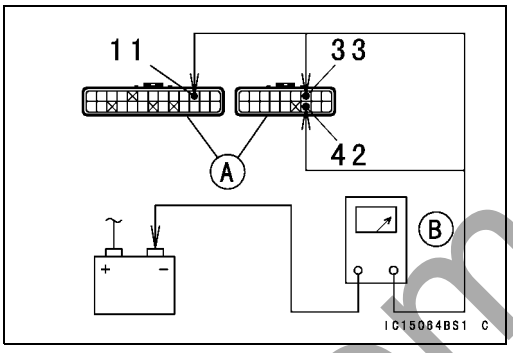
ECU



- Turn the ignition switch OFF.
- Disconnect the ECU connectors [A] (Main Harness).
- Set the hand tester [B] to the × 1 Ω range and check the following wiring for continuity.

Special Tool - Hand Tester: 57001-1394

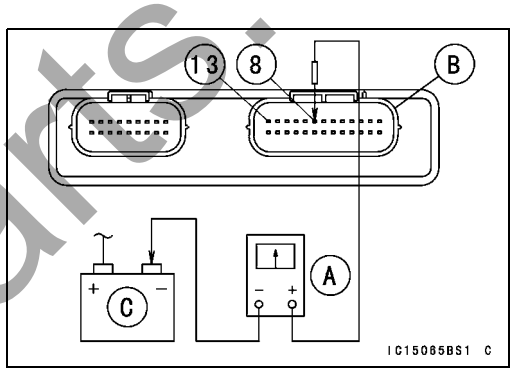
Main Harness Grounding Inspection
Connections:

BK/Y leads (11, 33 or 42 terminal)	←→	**Battery (–) Terminal**
Engine Ground	←→	**Battery (–) Terminal**

Criteria:
All: 0 Ω

★If no continuity, check the connectors, the engine ground lead, or main harness, and repair or replace them.

★If the wiring is good, check the power source voltage of the ECU.



NOTE

○*Be sure the battery is fully charged.*

- Connect the ECU connectors.
- Connect the hand tester [A] to the connector [B] with the needle adapter set.

Special Tool - Needle Adapter Set: 57001-1457

Battery [C]

ECU Power Supply Inspection
Connections:
(I) Tester (+) → Terminal 8 (W)
Tester (–) → Battery (–) Terminal
(II) Tester (+) → Terminal 13 (BR)
Tester (–) → Battery (–) Terminal
Ignition Switch OFF:
(I) Battery Voltage
(II) 0 V
Ignition Switch ON:
(I) Battery Voltage
(II) Battery Voltage

★If the reading is out of the specification, check the following.
Main Fuse 30 A (see Fuse Inspection in the Electrical System chapter)
ECU Fuse 10 A (see Fuse Inspection Electrical System chapter)
Power Source Wiring (see ECU Power Source Circuit)

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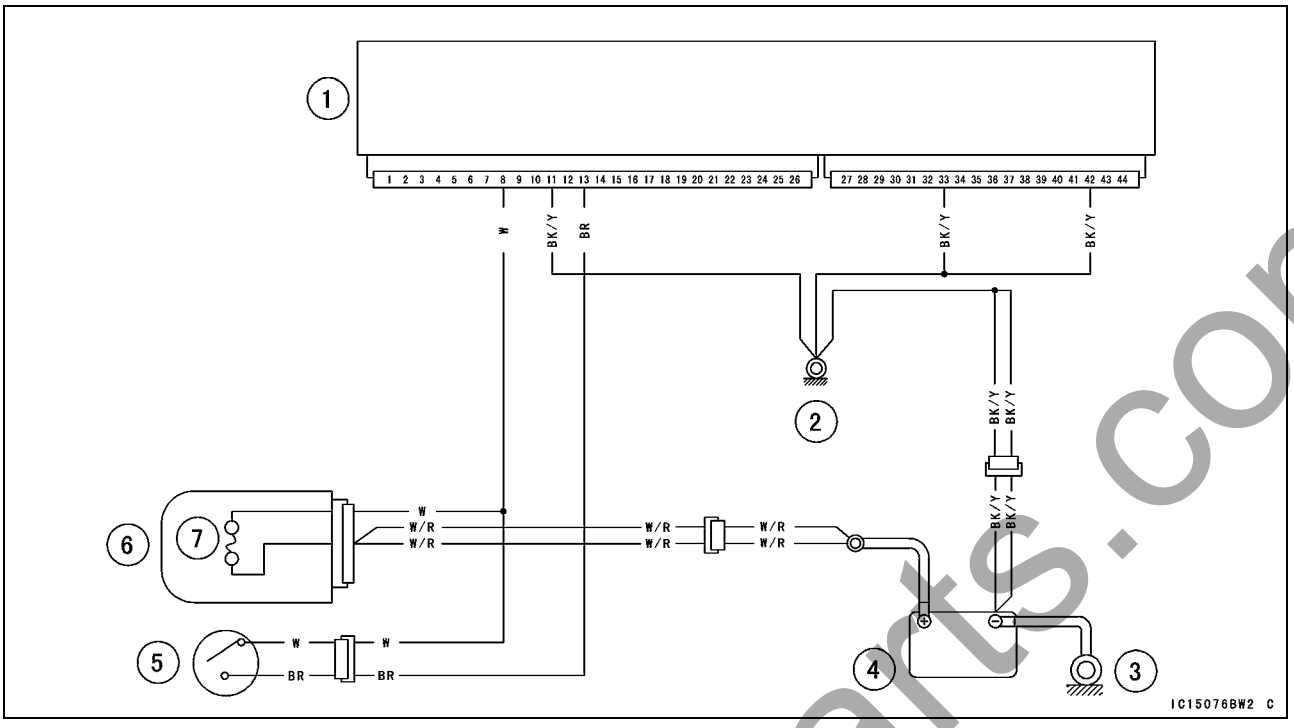
ECU

ECU Power Source Circuit



1. ECU (Electronic Control Unit)
2. Frame Ground 1
3. Engine Ground
4. Battery
5. Ignition Switch
6. Fuse Box
7. Main Fuse 30 A

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Fuel Line

Fuel Pressure Inspection

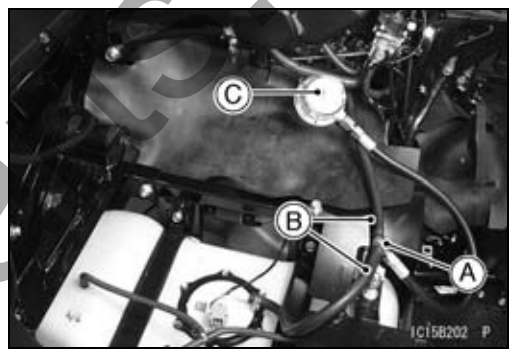
NOTE

○*Be sure the battery is fully charged.*

● Remove the fuel hose (see Fuel Hose Replacement).

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.



● Install the fuel pressure gauge adapter [A] and fuel hoses [B] (Special Tool) between the fuel pump outlet pipe and the delivery pipe.
● Connect the pressure gauge [C] to the fuel pressure gauge adapter.

Special Tools - Oil Pressure Gauge, 5 kgf/cm²: 57001-125
Fuel Pressure Gauge Adapter: 57001-1593
Fuel Hose: 57001-1607

⚠ WARNING

Fuel is extremely flammable and can be explosive under certain conditions resulting in serious injury or death.
Do not try to start the engine with the fuel hoses disconnected.

● Turn the ignition switch ON. The fuel pump will turn for 3 seconds, and then stop.

NOTE

○*Turn the ignition switch ON and inspect the fuel line leakage after installing the special tools.*

NOTICE

Do not drive the fuel pump without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

● Start the engine, and let it idle.
● Measure the fuel pressure with the engine idling.

Fuel Pressure (Idling)
Standard: 294 kPa (3.0 kgf/cm², 43 psi)

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Fuel Line

NOTE

○*The gauge needle will fluctuate. Read the pressure at the average of the maximum and minimum indications.*

- Turn the ignition switch OFF.

★If the fuel pressure is much higher than specified, the fuel pressure regulator in the fuel pump has been clogged or stuck. Replace the fuel pump (see Fuel Pump Removal).

★If the fuel pressure is much lower than specified, check the following.

Fuel Line Leakage (see Fuel Injector Fuel Line Inspection)

Amount of Fuel Flow (see Fuel Flow Rate Inspection)

- Remove the fuel pressure gauge, hoses and adapter.
- Install the removed parts.

Fuel Flow Rate Inspection

NOTE

○*Be sure the battery is fully charged.*

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Turn the ignition switch OFF.
- Wait until the engine cools down.
- Prepare a fuel hose (Special Tool) and a measuring cylinder.

Special Tool - Fuel Hose: 57001-1607

- Remove the fuel hose (see Fuel Hose Replacement).

⚠ WARNING

Fuel is flammable and explosive under certain conditions and can cause severe burns. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately. When the fuel hose is disconnected, fuel spills out from the hose and the pipe because of residual pressure. Cover the hose connection with a piece of clean cloth to prevent fuel spillage.

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Fuel Line

- Connect the prepared fuel hose [A] to the fuel pump outlet pipe.
- Secure the fuel hose with a clamp.
- Insert the fuel hose into the measuring cylinder [B].

⚠ WARNING

Wipe off spilled out fuel immediately.
Be sure to hold the measuring cylinder vertical.

- Turn the ignition switch ON. The fuel pump should operate for 3 seconds, and then should stop.

NOTICE

Do not drive the fuel pump without the fuel in the fuel tank. If the fuel pump is driven without the fuel, it may be damaged.

- Measure the discharge for 3 seconds.

Amount of Fuel Flow
Standard: 50 mL (1.7 US oz.) or more for 3 seconds

○Repeat this operation several times.
- Turn the ignition switch OFF.

★If the fuel flow is much less than the specified, replace the fuel pump (see Fuel Pump Removal/Installation).
- After inspection, connect the fuel hose (see Fuel Hose Replacement).
- Start the engine and check for fuel leakage.

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Fuel Pump

Fuel Pump Removal

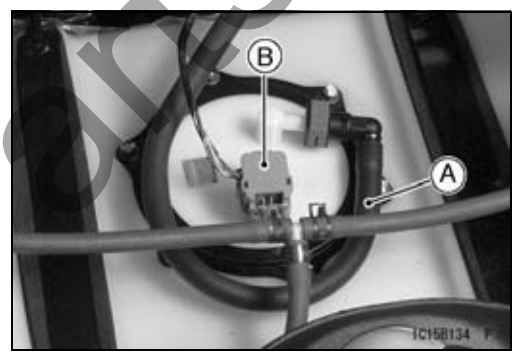
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Disconnect the battery (–) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

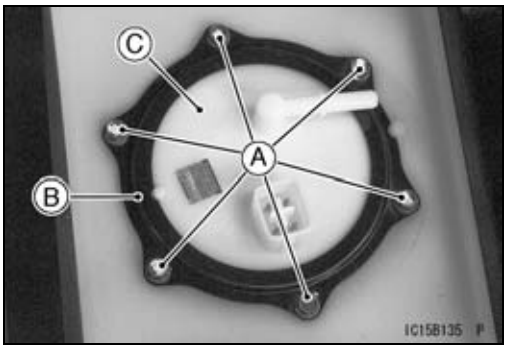
NOTICE

Never drop the fuel pump, especially on a hard surface. Such a shock to the pump can damage it.

● Remove:
Right Seat (see Seat Removal in the Frame chapter)
Fuel Hose [A] (see Fuel Hose Replacement)
Connector [B]

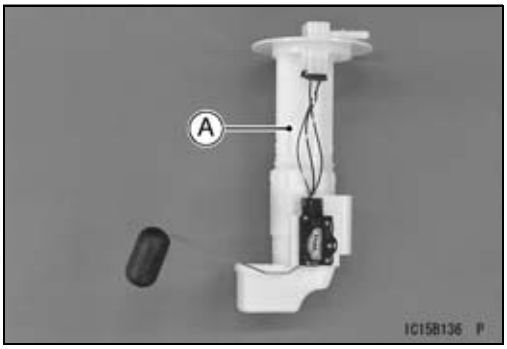


● Remove:
Fuel Pump Mounting Bolts [A]
Plate [B]
Fuel Pump [C]
O-ring



Fuel Pump Installation

● Remove dirt or dust from the fuel pump [A] by lightly applying compressed air.



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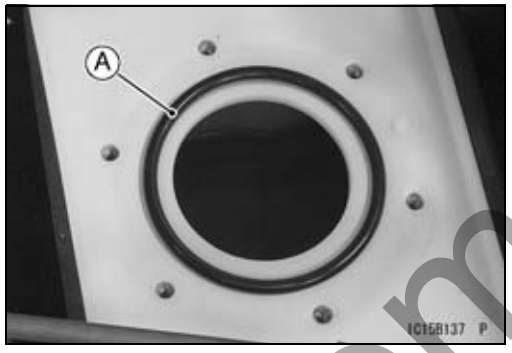
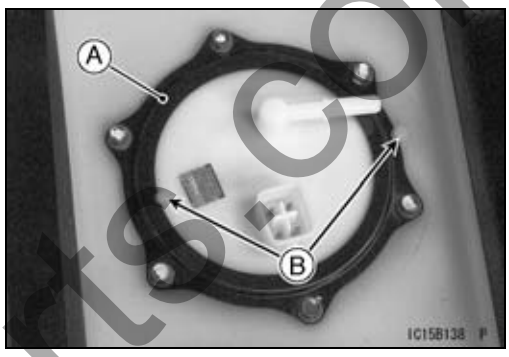
Fuel Pump

● Replace the O-ring [A] with a new one.



● Install the plate [A] so that the projections [B] of the fuel tank and fuel pump fit to the hollows of the plate.



● Tighten the fuel pump bolts to a snug fit, tighten them alternating diagonally.
● Tighten:

Torque - Fuel Pump Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

● Install:
Fuel Hose (see Fuel Hose Replacement)
Connector
● Start the engine and check the fuel hose for leaks.

Fuel Pump Operation Inspection

NOTE

○*Be sure the battery is fully charged.*
○*Just listen to the pump sound in the fuel tank to confirm pump operation.*

● Turn the ignition switch ON and make sure that the fuel pump operates (make light sounds) for 3 seconds, and then stops.
● Turn the ignition switch OFF.
★If the pump does not operate as described above, inspect the operating voltage (see Fuel Pump Operating Voltage Inspection).

Fuel Pump Operating Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

● Turn the ignition switch OFF.
● Remove:
Right Seat (see Seat Removal in the Frame chapter)

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Fuel Pump

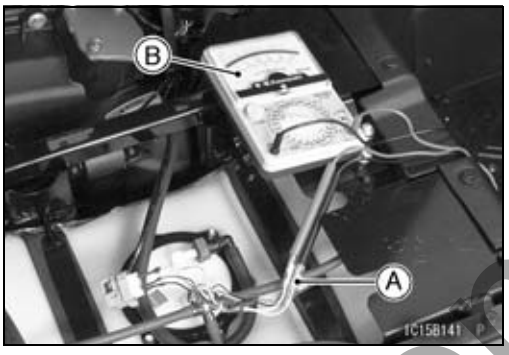
- Disconnect the fuel pump lead connector and connect the measuring adapter [A] between the connectors of the fuel pump and harness.

  Special Tool - Measuring Adapter: 57001-1700

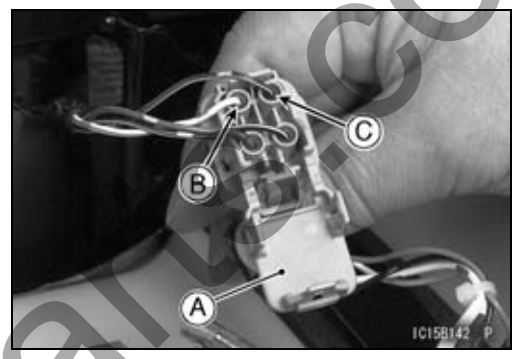
- Connect the hand tester [B] to the measuring adapter leads.

  Special Tool - Hand Tester: 57001-1394

  Connections to Adapter:
  Meter (+) → W/R lead of Main Harness
  Meter (–) → BK/Y lead of Main Harness



- Confirm the color of the lead by opening the cap [A] of the connector.
  W/R [B]
  BK/Y [C]



- Measure the operating voltage with engine stopped and with the connector joined.
- Turn the ignition switch ON.

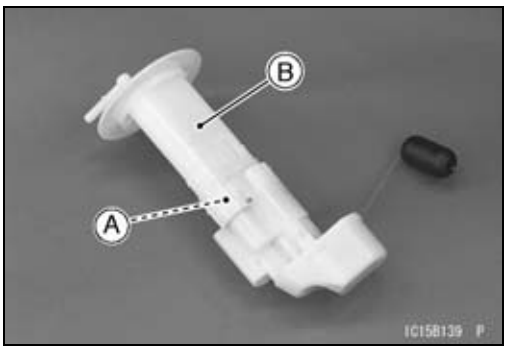
  Fuel Pump Operating Voltage
  Standard: Battery Voltage for 3 seconds, and then 0 V

- Turn the ignition switch OFF.

★If the reading is not the standard, check the fuel pump relay (see Relay Inspection in the Electrical System chapter).
★If the fuel pump relay is normal, check the wiring for continuity (see Fuel Pump Circuit).
★If the wiring is good, check the ECU for its ground and power supply (see ECU Power Supply Inspection).
★If the ground and power supply are good, replace the ECU (see ECU Removal/Installation).

Pressure Regulator Removal

○The pressure regulator [A] is built into the fuel pump [B] and cannot be removed.



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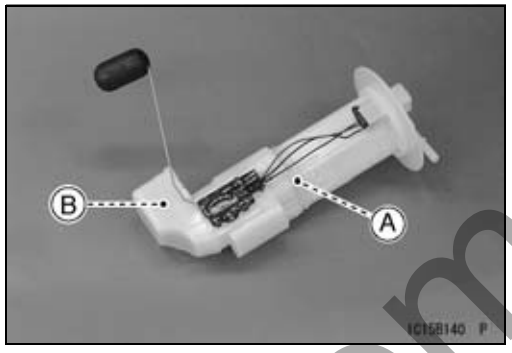
Fuel Pump

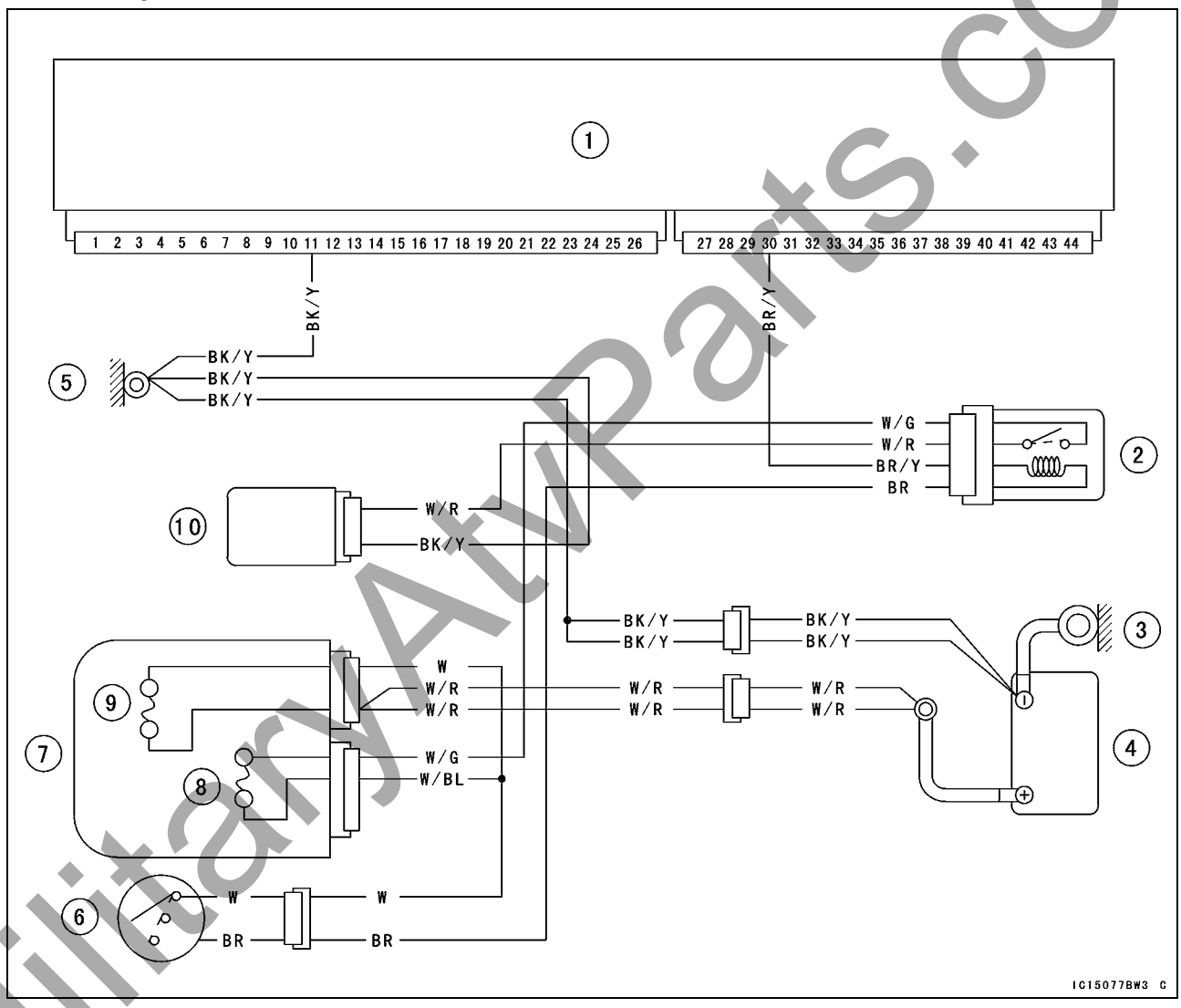
Fuel Filter Cleaning

○The fuel filter [A] and fuel strainer [B] are built into the pump and cannot be cleaned or checked.

★If the fuel filter is suspected of clogging or being damaged, replace the fuel pump.



Fuel Pump Circuit



1. ECU (Electronic Control Unit)
2. Fuel Pump Relay
3. Engine Ground
4. Battery
5. Frame Ground 1
6. Ignition Switch
7. Fuse Box
8. Fuel Pump Fuse 10 A
9. Main Fuse 30 A
10. Fuel Pump

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Throttle Pedal and Cable

Throttle Pedal Free Play Inspection

- Refer to the Throttle Pedal Free Play Inspection in the Periodic Maintenance chapter.

Throttle Pedal Free Play Adjustment

- Refer to the Throttle Pedal Free Play Adjustment in the Periodic Maintenance chapter.

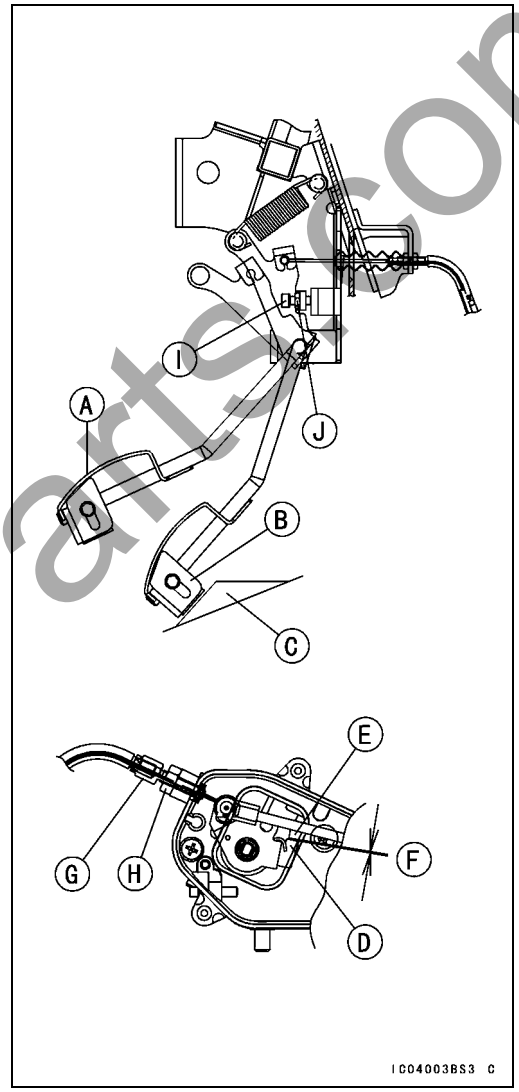
Throttle Pedal Position Adjustment

- Depress the throttle pedal [A] until the pedal stopper [B] touches to the floorboard [C].
- Then adjust the gap between the stopper [D] of the link lever and stopper [E] of the throttle body to 1 mm (0.04 in.) [F] by adjusting the adjusting nut [G].
- Tighten:

Torque - Throttle Cable Locknut [H]: 4.4 N·m (0.45 kgf·m, 39 in·lb)

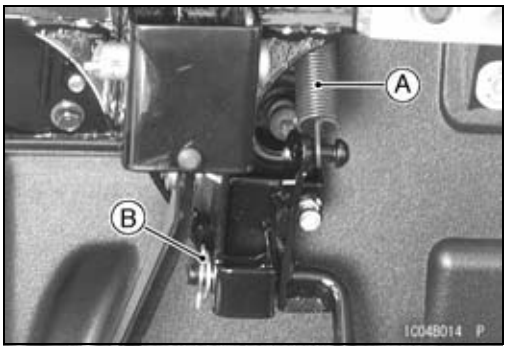
- Set the rest position of the throttle pedal by adjusting the throttle pedal position bolt [I] so that the throttle vale is not open.
- Tighten:

Torque - Throttle Pedal Position Bolt Locknut [J]: 10.8 N·m (1.1 kgf·m, 96 in·lb)



Throttle Pedal Removal

- Remove:
  Spring [A]
  Snap Pin [B] and Washer
- Remove the throttle pedal from the bracket.



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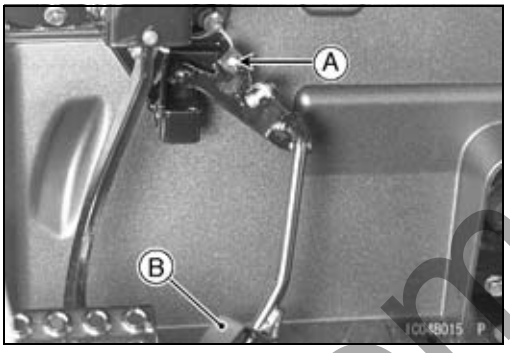
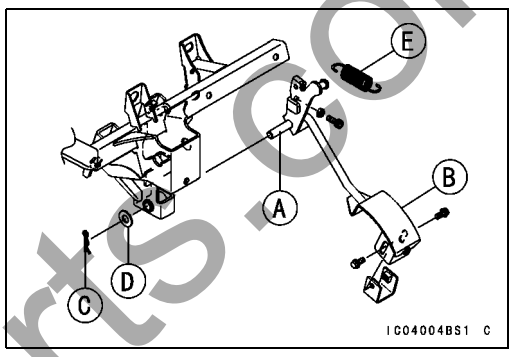
Throttle Pedal and Cable

- Remove the throttle cable end [A] from the throttle pedal [B].

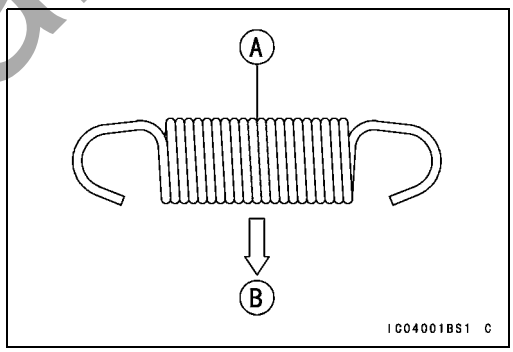


Throttle Pedal Installation

- Apply grease:
  Throttle Cable End
  Pin [A] of Throttle Pedal
- Install:
  Throttle Cable End
  Throttle Pedal [B]
  Snap Pin [C] and Washer [D]
  Spring [E]
- Do not use a needle nose pliers for the damage prevention of the spring.



- Install the spring [A] as shown in the figure.
  Downward [B]



Throttle Cable Installation

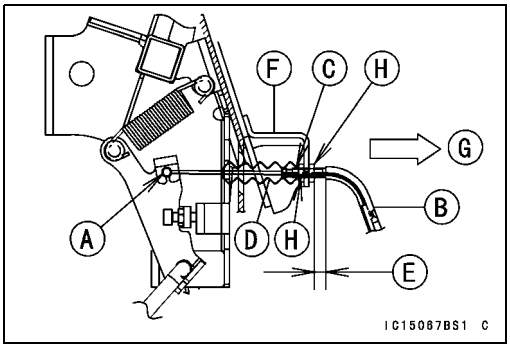
- Lubricate the throttle cable before installation.

⚠ WARNING

Operation with incorrectly routed or improperly adjusted cables could result in an unsafe riding condition.
Be sure the cables are routed correctly and properly adjusted.

- Apply grease to the cable ends [A].
- Install the front end of the throttle cable [B] as shown in the figure.
- Install the end [C] of the boot [D] to the groove of the joint.
  4 ~ 8 mm (0.15 ~ 0.31 in.) [E]
  Bracket [F]
  Front [G]
- Tighten:

  Torque - Throttle Cable Locknuts [H]: 4.4 N·m (0.45 kgf·m, 39 in·lb)



- Adjust the full throttle pedal position (see Full Throttle Pedal Position Adjustment).
- Check the throttle cable (see Throttle Pedal Free Play Inspection).

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Throttle Pedal and Cable

Throttle Cable Lubrication and Inspection

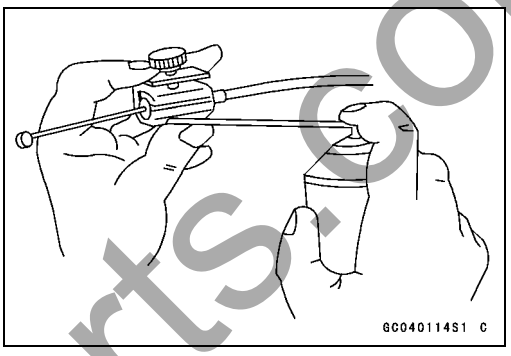
- Before lubricating each part, clean off any rusty spots with rust remover and wipe off any grease, oil, dirt, or grime.
- Lubricate the points listed below with indicated lubricant.

NOTE

○*Whenever the vehicle has been operated under wet or rainy conditions, or especially after using a high-pressure spray water, perform the general lubrication.*

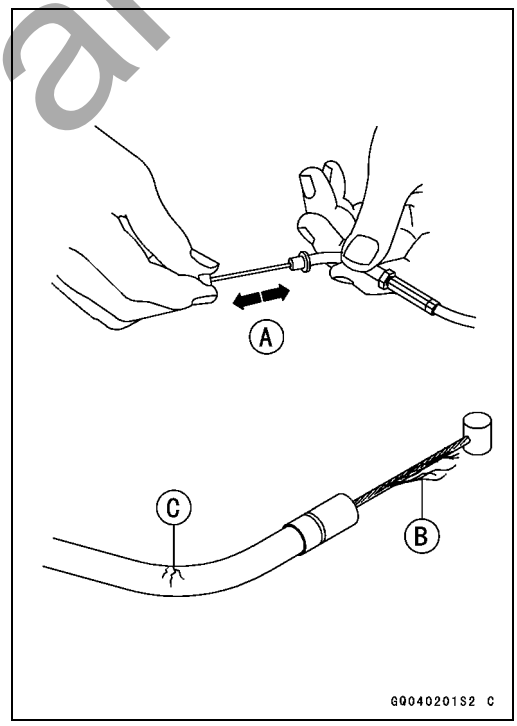
- Lubricate the cables by seeping the oil between the cable and housing.

○The cable may be lubricated by using a pressure cable luber with an aerosol cable lubricant.

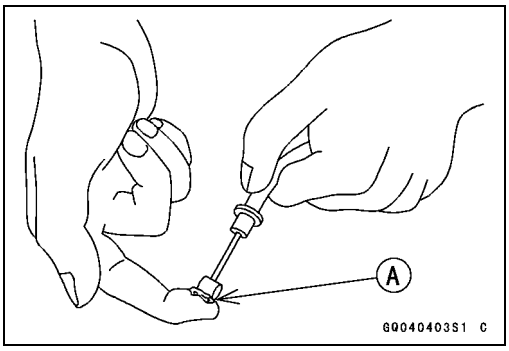


- With the cable disconnected at the both ends, the cable should move freely [A] within the cable housing.

★If cable movement is not free after lubricating, if the cable is frayed [B], or if the cable housing is kinked [C], replace the cable.



- Lubricate the inner cable ends [A] with grease.



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Throttle Body Assy

Idle Speed Inspection

- Refer to the Idle Speed Inspection in the Periodic Maintenance chapter.

Idle Speed Adjustment

NOTE

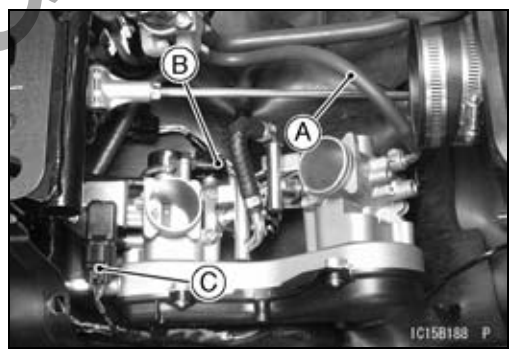
○*Idle speed adjustment is best performed by ECU, so idle speed cannot be adjusted.*

Throttle Body Assy Removal

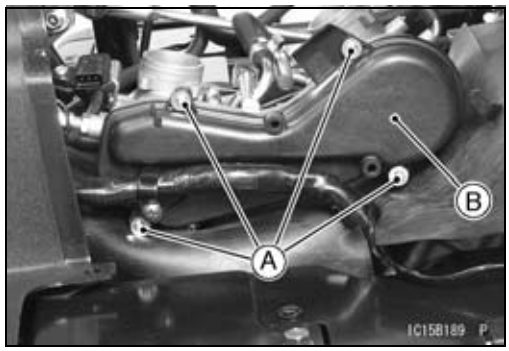
⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Disconnect the battery (-) terminal. To avoid fuel spills, draw it from the tank when the engine is cold. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

- Remove:
  Air Cleaner Duct (see Air Cleaner Housing and Duct Removal)
  Fuel Hose (see Fuel Hose Replacement)
  Fuel Injectors (see Fuel Injector Removal)
  ISC Valve Hose [A]
- Disconnect:
  Throttle Sensor Connector [B]
  Inlet Air Pressure Sensor Connector [C]



- Remove:
  Screws [A] and Washers
  Throttle Link Case Cover [B]



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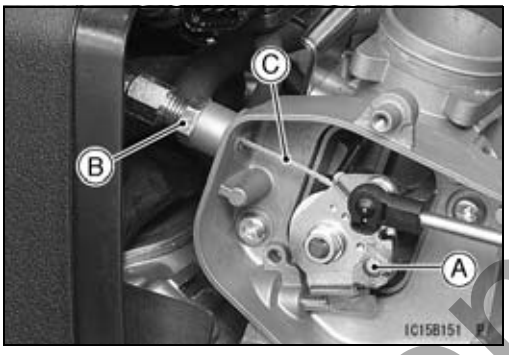
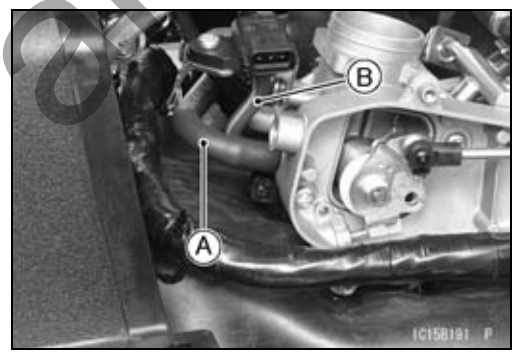
Throttle Body Assy

- Remove:
  Throttle Cable End [A]
- Loosen the throttle cable locknut [B] and remove the throttle cable [C] from the throttle link case.



- Loosen the clamp screws [A] fully.
- Remove the throttle body assy [B] from the throttle body assy holders.

- Remove:
  ISC Valve Hose [A]
  Vacuum Hose [B]
- After removing the throttle body assy, stuff pieces of lint-free, clean cloth into the throttle body assy holders.



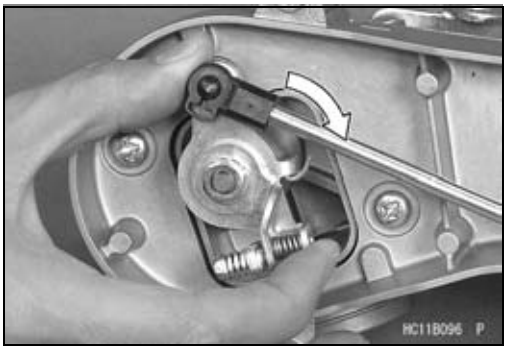
NOTICE

If dirt gets into the engine, excessive engine wear and possible engine damage will occur.

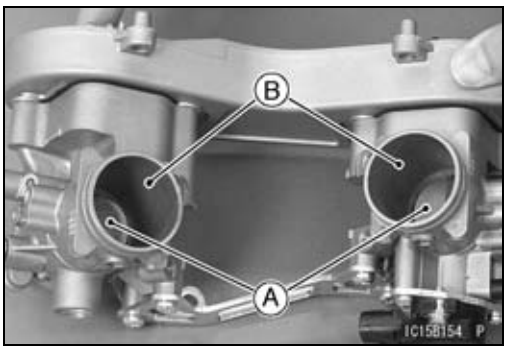
Throttle Body Assy Installation

- Turn the throttle pulley to check that the throttle valve move smoothly and return by spring force.

★If the throttle valve do not move smoothly, replace the throttle body assy.



- Open the butterfly valves [A], and wipe any carbon off the throttle bores [B] around the valve, using a piece of lint-free cloth penetrated with a high-flash point solvent.
- Blow away dirt or dust from the throttle body by applying compressed air.



NOTICE

Do not immerse the throttle body in a high-flash point solvent for cleaning. This could damage the throttle sensor on the throttle body.

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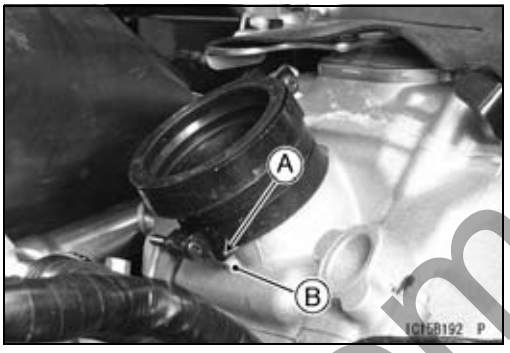
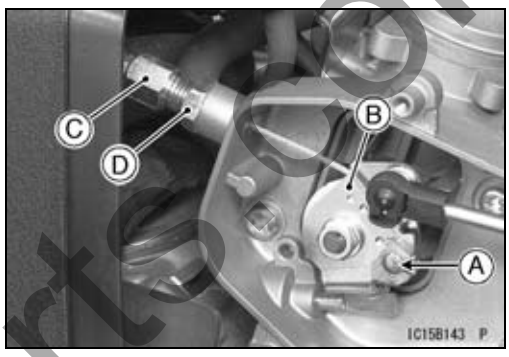
Throttle Body Assy

- Be sure to groove [A] of the throttle body assy holder fits on the projection [B] of the cylinder head.
- Install:
  Vacuum Hose
  ISC Valve Hoses
  Throttle Body Assy
- Tighten the throttle body assy holder clamp screw securely.



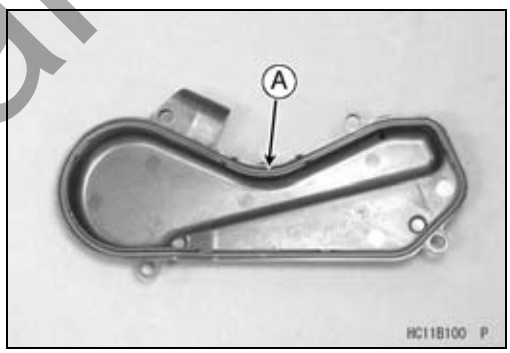
- Apply a thin coating of grease to the throttle cable rear end [A] .
- Fit the throttle cable rear end into the throttle pulley [B].
- Tighten the adjusting nut [C] and locknut [D] (see Throttle Cable Installation).



- Be sure to install the seal [A] on the throttle link case cover.
- Install the removed parts.
- Check the throttle pedal free play (see Throttle Pedal Free Play Inspection).

⚠ WARNING

Operation with an incorrectly routed cable could result in an unsafe riding condition. Be sure the cable is routed correctly.

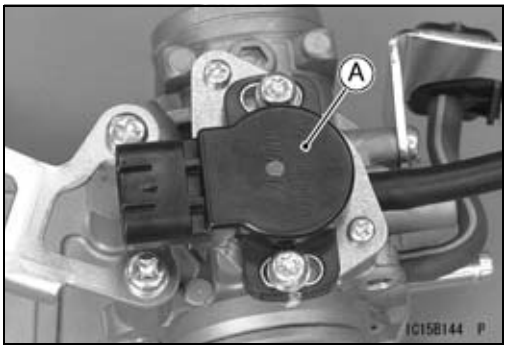


- Adjust:
  Idle Speed (see Idle Speed Adjustment)

Throttle Body Assy Disassembly

NOTICE

Do not remove, disassemble or adjust the throttle sensor [A] and throttle body assy, because they are adjusted or set at the manufacturer. Adjustment of these parts could result in poor performance, requiring replacement of the throttle body assy.



NOTICE

Never drop the throttle body assy , especially on a hard surface. Such a shock to the body assy can damage it.

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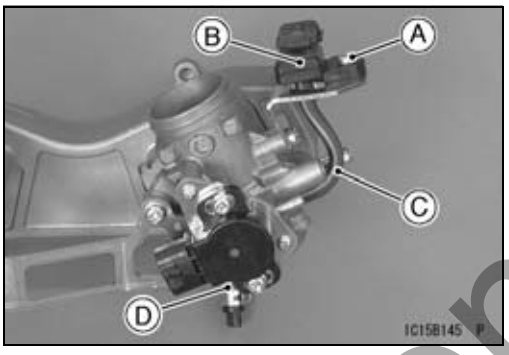
Throttle Body Assy

- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal)
  Screw [A]
  Inlet Air Pressure Sensor [B]
  Vacuum Hose [C]
- Remove the drain tube [D], if necessary.

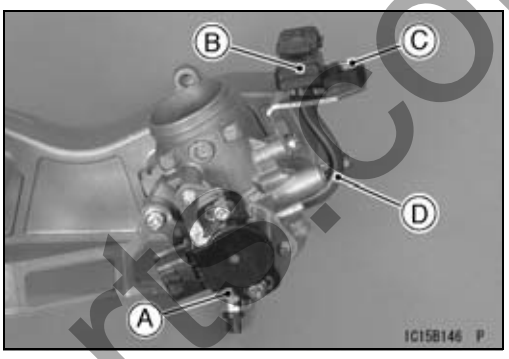


Throttle Body Assy Assembly

- Install the drain tube [A], if removed.
- Install the inlet air pressure sensor [B].
- Tighten:

Torque - Inlet Air Pressure Sensor Mounting Screw [C]: 5.0 N·m (0.51 kgf·m, 44 in·lb)

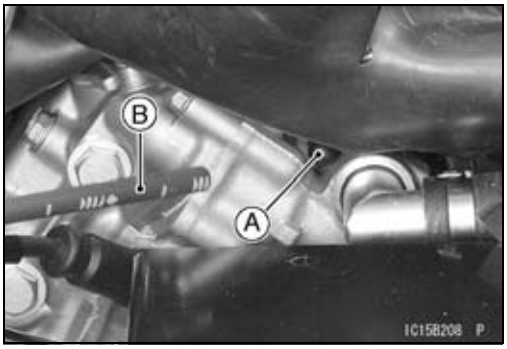
- Connect the vacuum hose [D].



Engine Vacuum Synchronization Inspection

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
- Check idle speed (see Idle Speed Inspection).
- Remove the plug [A] and connect the hose [B] of the vacuum gauge.

Special Tool - Vacuum Gauge: 57001-1369



- Remove the vacuum hose [A] and connect the hose [B] of the vacuum gauge.
- Connect the vacuum gauge [C].
- Start the engine and read the intake vacuum when idling.
- ★If the vacuum is out of the specified range, check the ISC valve (see ISC Valve Inspection).
- ★If the ISC valve is good, adjust the vacuum (see Engine Vacuum Synchronization Adjustment).

Engine Vacuum
Standard: 29.6 ±1.3 kPa (222 ±9.8 mmHg) at Idle Speed

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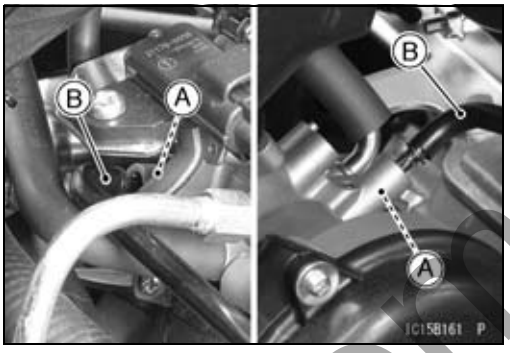
Throttle Body Assy

Engine Vacuum Synchronization Adjustment



- Turn in the bypass screws [A] until it seats fully but not tightly.

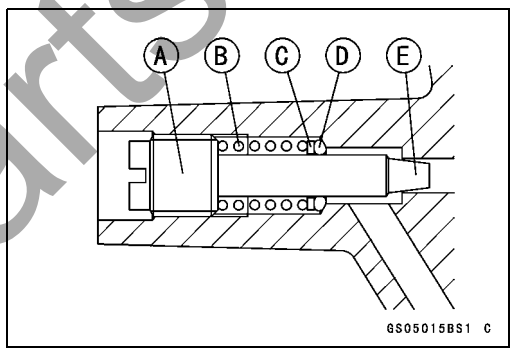
Special Tool - Pilot Screw Adjuster, A [B]: 57001-1239

NOTICE
Do not over tighten them. They could be damaged, requiring replacement.

- Turn out the bypass screw until the vacuum enters the standard.
- Open and close the throttle valves after each measurement and adjust the bypass screw as necessary.

★If both vacuums are within the standard, finish the engine vacuum synchronization.

★If any vacuum cannot be adjusted within the standard, remove the bypass screws #1, #2 and clean them.



- Remove:
  Bypass Screw [A]
  Spring [B]
  Washer [C]
  O-ring [D]
- Check the bypass screw and its hole for carbon deposits.

★If any carbon accumulates, wipe the carbon off the bypass screw and the hole, using a cotton pad penetrated with a high-flash point solvent.

- Replace the O-ring with a new one.
- Check the tapered portion [E] of the bypass screw for wear or damage.

★If the bypass screw is worn or damaged, replace it.

- Turn in the bypass screw until it seats fully but not tightly.
- Repeat the same procedure for other bypass screw.
- Repeat the synchronization adjustment.

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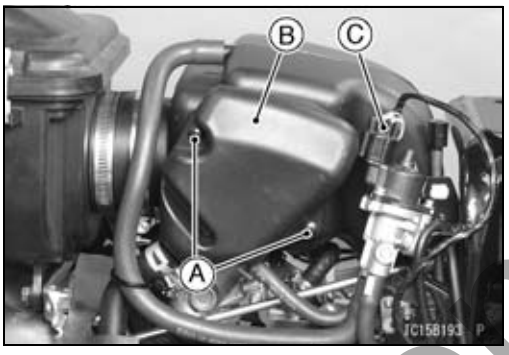
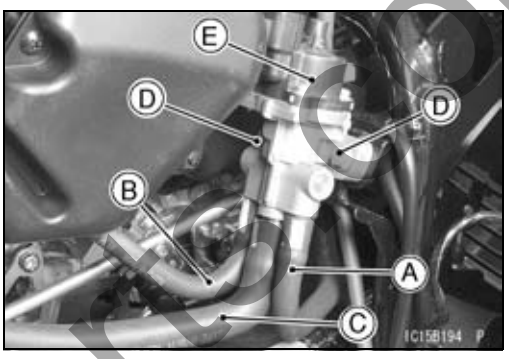
ISC Valve

ISC Valve Removal

● Remove:
Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
Screws [A] and Resonator [B]
Connector [C]



● Remove:
ISC Valve Hose (Front) [A]
ISC Valve Hose (Rear) [B]
ISC Valve Hose (Primary) [C]
Bolts [D]
ISC Valve [E]



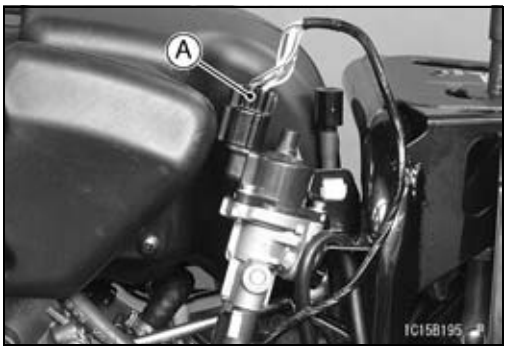
ISC Valve Installation

● Install the ISC valve.
● Tighten:

Torque - ISC Valve Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

ISC Valve Inspection

● Remove:
Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
ISC Valve Connector [A]



● Connect the hand tester to the following pair of terminals.

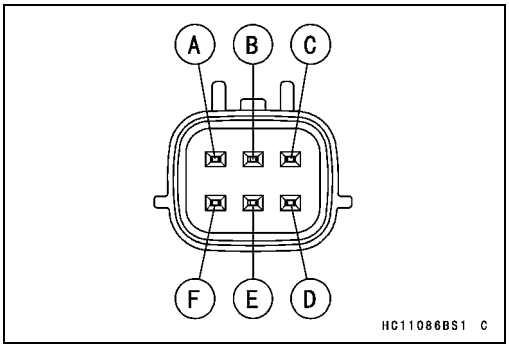
Special Tool - Hand Tester: 57001-1394

● Set the hand tester to the × 1 Ω range.

Connections:

Terminal A-B,	**Terminal B-C**
Terminal D-E,	**Terminal E-F**

Standard Resistence:
28.8 ~ 31.2 Ω at 20°C (68°F)



★If the tester does not read as specified, replace the ISC valve.

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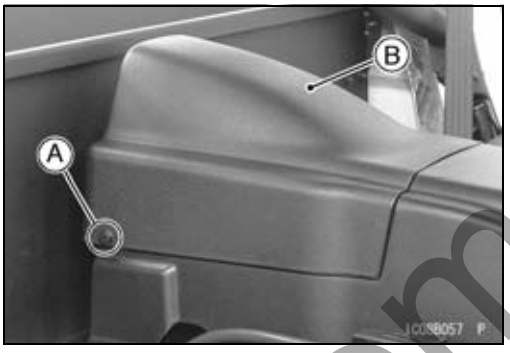
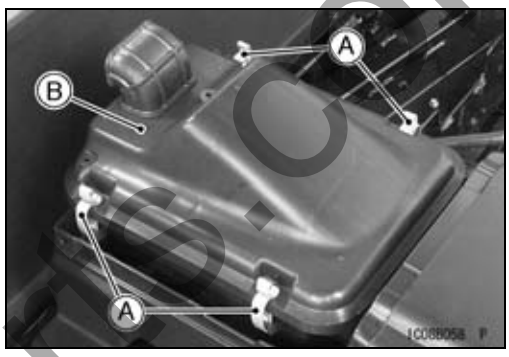
Air Cleaner

Air Cleaner Element Removal

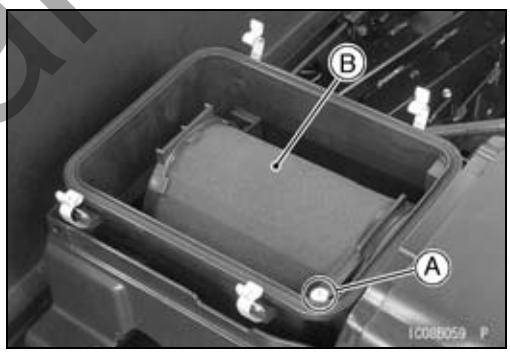
- Remove:
  Quick Rivets [A] (both sides)
  Air Cleaner Top Cover [B]



- Remove:
  Clips [A]
  Air Cleaner Housing Cap [B]



- Remove:
  Element Holder Screw [A]
  Element Assembly [B]
- After removing the element, stuff pieces of lint-free, clean cloth into the air cleaner ducts to keep dirt out of the carburetor and engine.



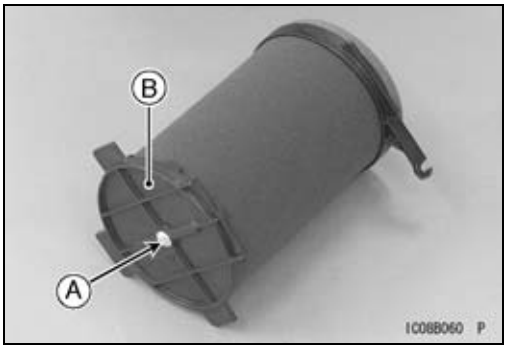
⚠ WARNING

If dirt or dust is allowed to pass through into the throttle body assy, the throttle may become stuck, possibly causing accident.
Replace the air cleaner element according to the maintenance chart.

NOTICE

If dirt gets through into the engine, excessive engine wear and possibly engine damage will occur.

- Remove:
  Element Cover Screw [A]
  Element Cover [B]



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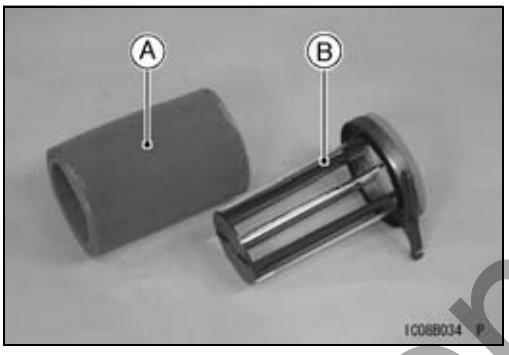
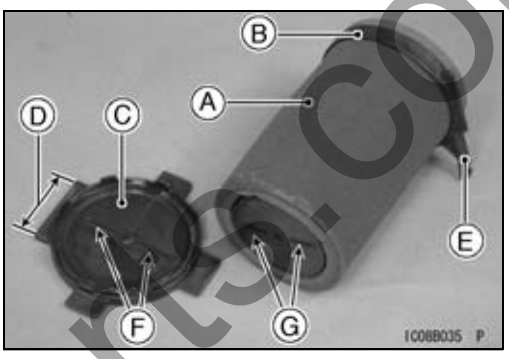
Air Cleaner

- Remove:
  Element [A]
  Element Holder [B]



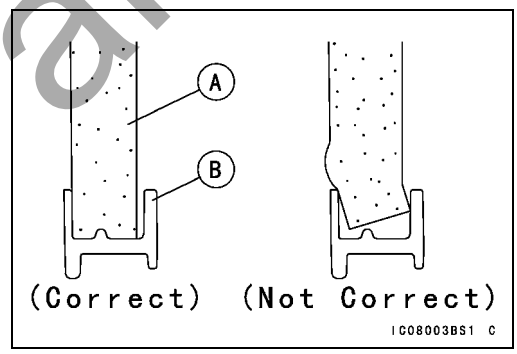
Air Cleaner Element Installation

- Install:
  Element [A]
  Element Holder [B]
- Install the element cover [C] so that the wider side [D] faces projection [E] of the holder and fit the slits [F] onto the projections [G].



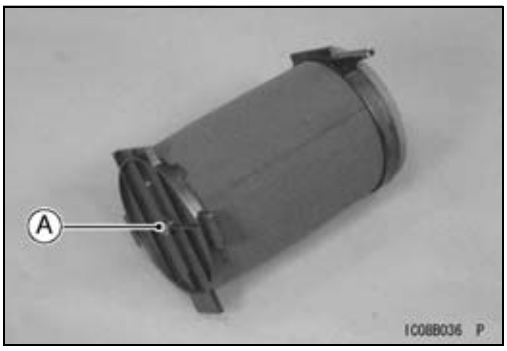
NOTE

○*Be sure that the edge of the element [A] fits completely in the groove and does not rest on the edge of the element holder [B] or become folded in the groove as shown in the figure.*

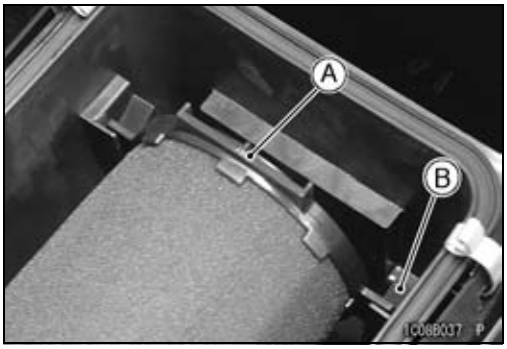


- Tighten:

Torque - Element Cover Screw [A]: 4.5 N·m (0.46 kgf·m, 40 in·lb)



- Push down the element holder [A] until it is bottomed into the housing [B] as shown in the figure.



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Air Cleaner

- Tighten:

Torque - Element Holder Screw: 4.5 N·m (0.46 kgf·m, 40 in·lb)

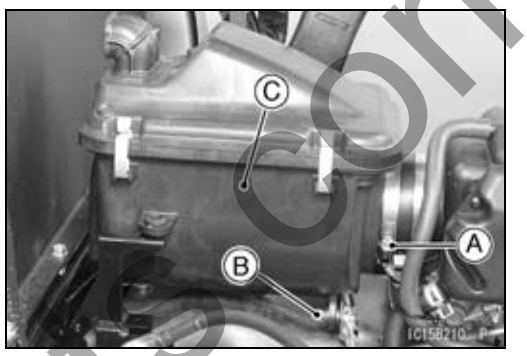
- Install the air cleaner housing cap and fit the clips.

Air Cleaner Element Cleaning and Inspection

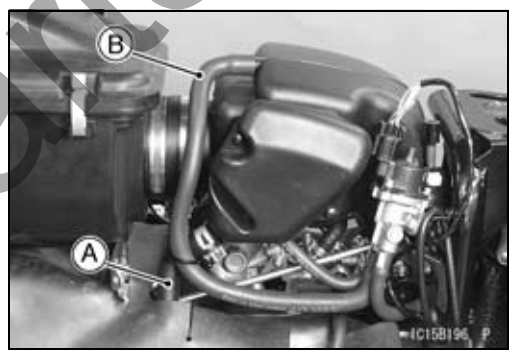
- Refer to the Air Cleaner Element Cleaning and Inspection in the Periodic Maintenance chapter.

Air Cleaner Housing and Duct Removal

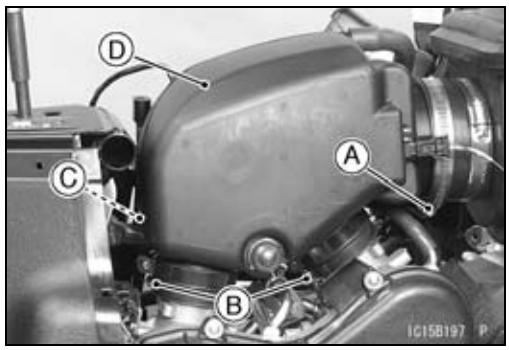
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Loosen the clamp screw [A].
- Remove:
  Air Cleaner Mounting Bolts [B] (both sides)
  Air Cleaner Housing [C]



- Remove:
  Breather Hose [A] and Clamp
  ISC Valve Hose [B]

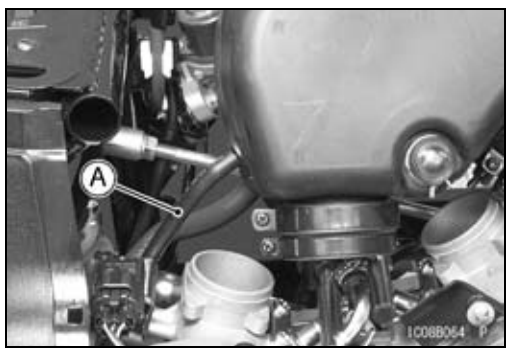


- Disconnect:
  Inlet Air Temperature Sensor Connector [A]
- Loosen:
  Clamp Screws [B]
- Remove:
  Hose [C]
  Air Cleaner Duct [D]



Air Cleaner Housing and Duct Installaion

- Install:
  Hose [A]



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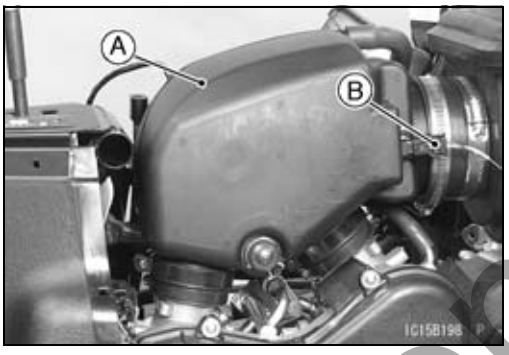
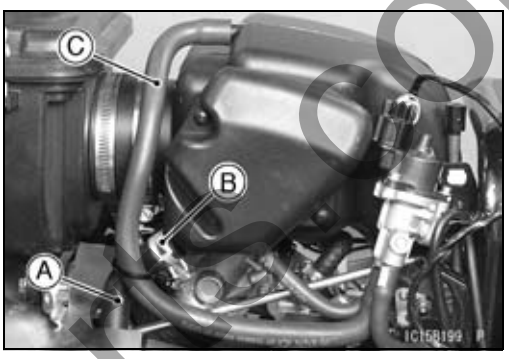
Air Cleaner

- Install the air cleaner duct assembly [A] to the throttle body assy.
- Tighten the clamp screws.
- Connect:
  Inlet Air Temperature Sensor Connector [B]

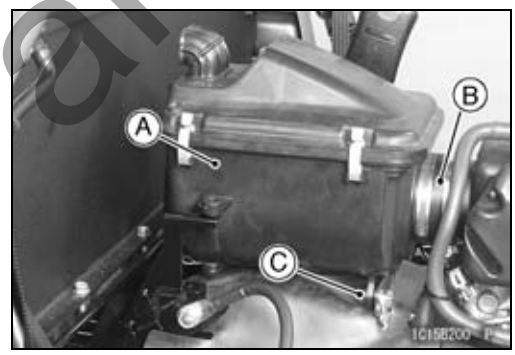


- Install:
  Breather Hose [A] and Clamp [B]
  ISC Valve Hose [C]



- Install the air cleaner housing [A] to the rubber duct [B].
- Apply a non-permanent locking agent:
  Air Cleaner Mounting Bolts [C] (both sides)
- Tighten:

Torque - Air Cleaner Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



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Fuel Tank and Fuel Hose

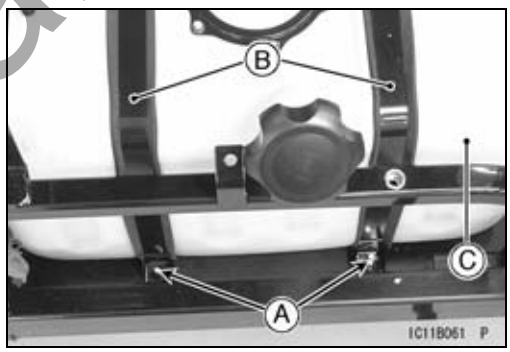
Fuel Tank Removal

⚠ WARNING

Gasoline is extremely flammable and can be explosive under certain conditions, creating the potential for serious burns. Make sure the area is well-ventilated and free from any source of flame or sparks; this includes any appliance with a pilot light. Do not smoke. Turn the ignition switch OFF. Be prepared for fuel spillage; any spilled fuel must be completely wiped up immediately.

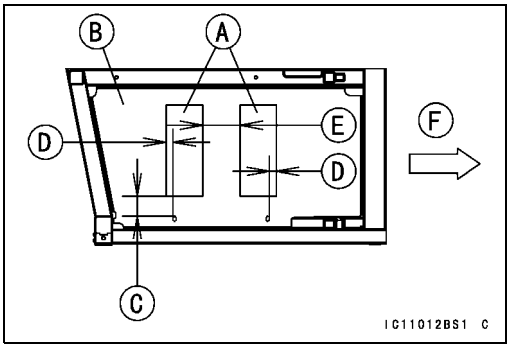
● Remove:
Right Side Cover (see Side Cover Removal in the Frame chapter)
Right Bracket (see Bracket Removal in the Frame chapter)
Fuel Hose [A] (see Fuel Hose Replacement)
Breather Hoses [B]
Fuel Pump Connector [C]

● Remove:
Fuel Tank Band Bolts [A] and Washers
Bands [B]
Fuel Tank [C]



Fuel Tank Installation

● Check the dampers [A] on the frame [B].
★If the dampers are damaged or deteriorated, replace them.
● When installing the dampers, install them as shown in the figure.
44 mm (1.7 in.) [C]
15 mm (0.6 in.) [D]
82 mm (3.2 in.) [E]
Front [F]



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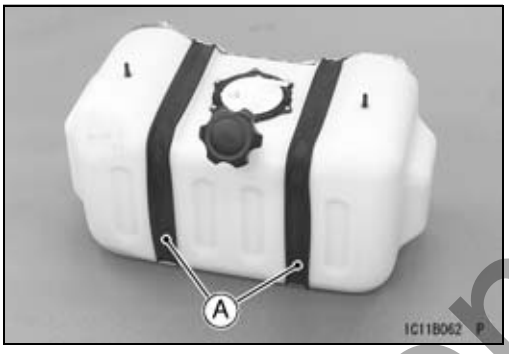
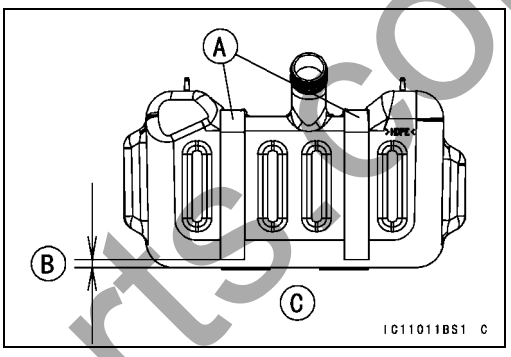
Fuel Tank and Fuel Hose

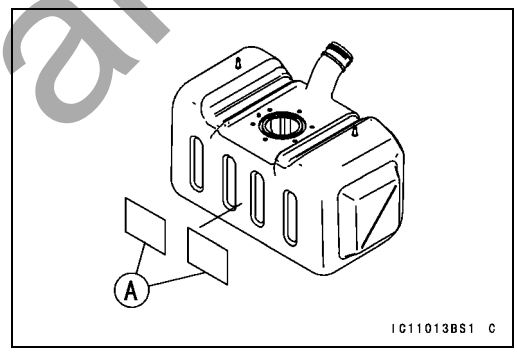
● Check the dampers [A] on the fuel tank.
★If the dampers are damaged or deteriorated, replace them.



● When installing the dampers [A], install them so that the distance to the damper end from the bottom of the fuel tank is 10 mm (0.39 in.) [B].
Right Side View [C]

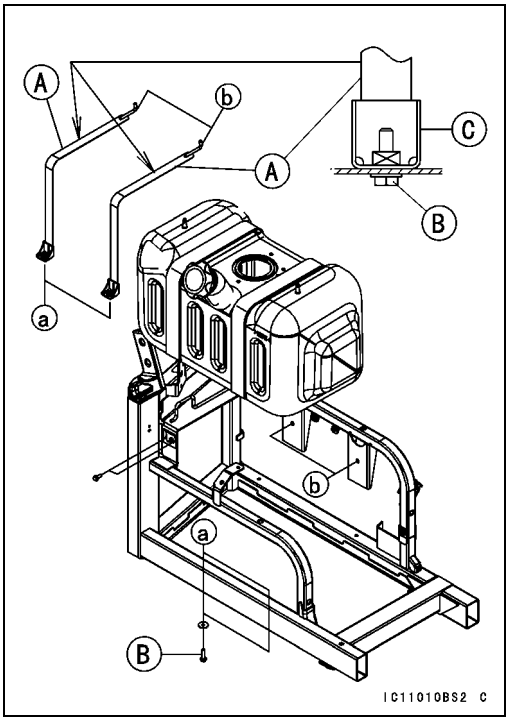


● Check the mats [A] on the fuel tank.
★If the mat is damaged or deteriorated, replace it.



● Install:
Fuel Tank
Bands [A]
Fuel Tank Band Bolts [B] and Washers
● Tighten the bolts until the brackets [C] of the bands touch the frame.
● Tighten:

Torque - Fuel Tank Band Bolts: 11 N·m (1.1 kgf·m, 97 in·lb)



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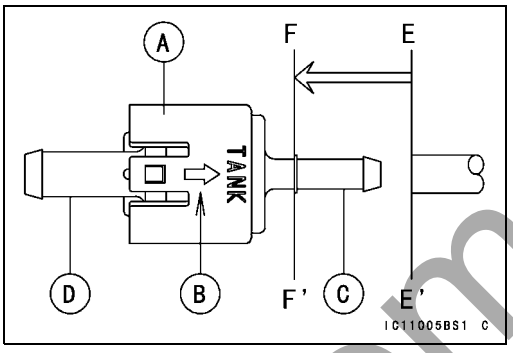
Fuel Tank and Fuel Hose



- When installing the check valve [A], install it so that the arrow [B] faces fuel tank.
  Black Color [C]
  Blue Color [D]
- Fit the hose edge (E-E') to the line (F-F') of the check valve.

- Install:
  Fuel Hose (see Fuel Hose Replacement)
  Breather Hoses and Clamps

Fuel Tank Cleaning

⚠ WARNING

Gasoline and low-flash point solvents can be flammable and/or explosive and cause severe burns. Clean the tank in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area. Do not use gasoline or low-flash point solvents to clean the tank.

- Remove the fuel tank and drain it.
- Remove:
  Fuel Pump (see Fuel Pump Removal)
- Pour some high-flash point solvent into the fuel tank and shake the tank to remove dirt and fuel deposits.
- Draw the solvent out of the fuel tank.
- Dry the tank with compressed air.
- Install:
  Fuel Pump (see Fuel Pump Installation)
  Fuel Tank (see Fuel Tank Installation)

Fuel Hose Inspection

- Refer to the Fuel Hose and Connections Inspection in the Periodic Maintenance chapter.

Fuel Hose Replacement

Refer to the Fuel Hose Replacement in the Periodic Maintenance chapter.

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Cooling System

Table of Contents

Exploded View 4-2
Coolant Flow Chart 4-4
Specifications 4-6
Special Tools 4-7
Coolant 4-8
  Coolant Deterioration Inspection 4-8
  Coolant Level Inspection 4-8
  Coolant Draining 4-8
  Coolant Filling 4-8
  Pressure Testing 4-9
Water Pump 4-10
  Water Pump Cover Removal 4-10
  Water Pump Cover Installation 4-10
  Water Pump Impeller Removal 4-10
  Water Pump Impeller Installation 4-10
  Water Pump Impeller Inspection 4-11
  Water Pump Leakage Inspection 4-11
  Mechanical Seal Replacement 4-11
Radiator 4-13
  Radiator Removal 4-13
  Radiator Installation 4-14
  Radiator Fan Removal 4-14
  Radiator Fan Installation 4-14
  Radiator Inspection 4-15
  Radiator Cleaning 4-15
  Radiator Cap Inspection 4-15
Thermostat 4-16
  Thermostat Removal 4-16
  Thermostat Installation 4-16
  Thermostat Inspection 4-16
Water Temperature Sensor 4-17
  Water Temperature Sensor Removal/Installation 4-17
  Water Temperature Sensor Inspection 4-17

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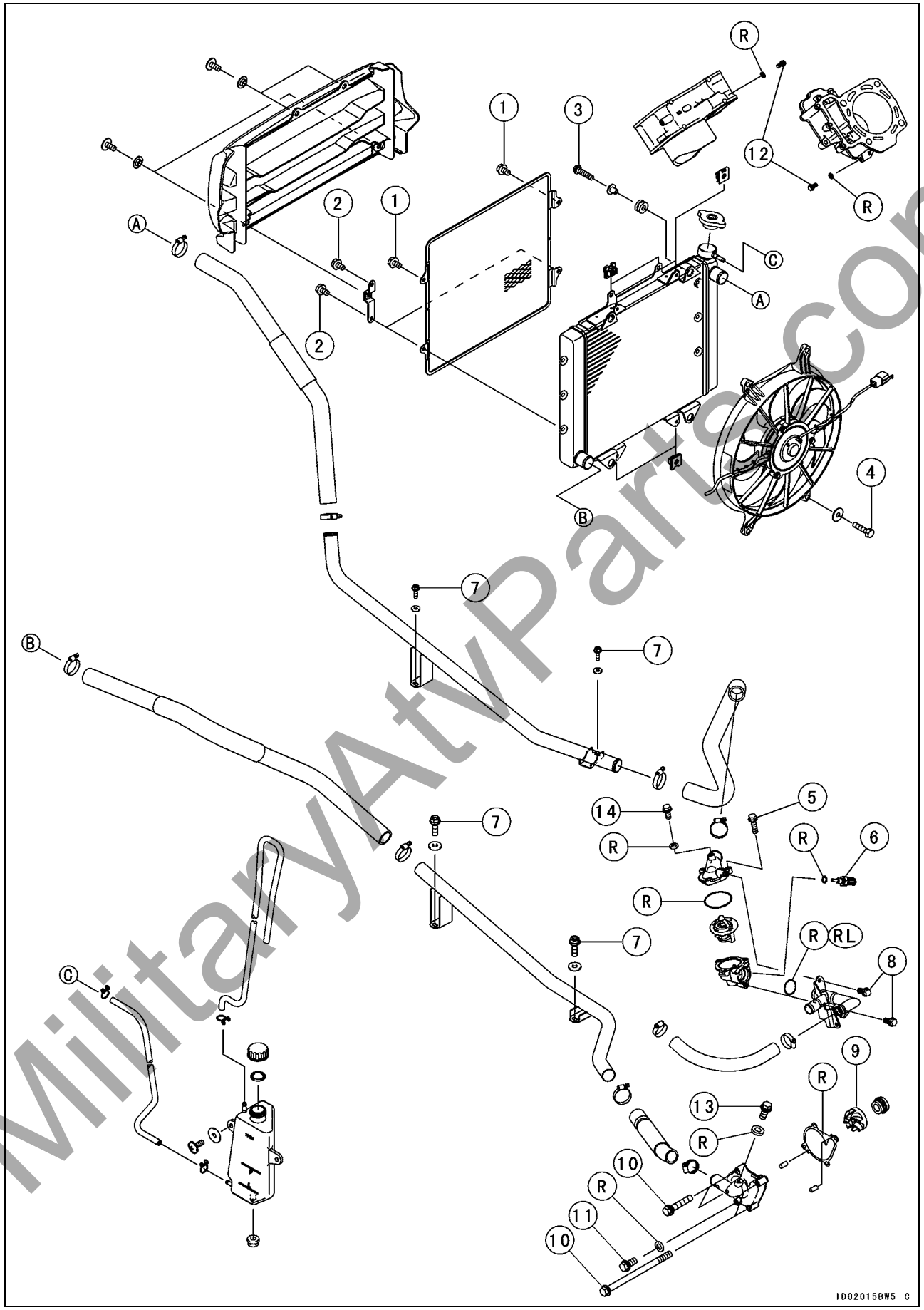
4-2 COOLING SYSTEM

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Radiator Screen Mounting Bolts	8.8	0.90	78 in·lb	
2	Radiator Cover Bracket Mounting Bolts	8.8	0.90	78 in·lb	
3	Radiator Mounting Bolts	8.8	0.90	78 in·lb	
4	Radiator Fan Assembly Bolts	8.3	0.85	73 in·lb	
5	Thermostat Housing Cover Bolts	8.8	0.90	78 in·lb	
6	Water Temperature Sensor	12	1.2	106 in·lb	
7	Water Pipe Mounting Bolts, L = 20 mm (0.79 in.)	8.8	0.90	78 in·lb	
8	Water Pipe Mounting Bolts, L = 12 mm (0.47 in.)	8.8	0.90	78 in·lb	
9	Water Pump Impeller	7.8	0.80	69 in·lb	
10	Water Pump Cover Bolts	8.8	0.90	78 in·lb	
11	Coolant Drain Plug (Water Pump)	7.0	0.71	62 in·lb	
12	Coolant Drain Plugs (Cylinder)	7.0	0.71	62 in·lb	
13	Coolant Air Bleed Bolt (Water Pump)	7.0	0.71	62 in·lb	
14	Coolant Air Bleed Bolt (Thermostat)	7.8	0.80	69 in·lb	

G: Apply grease.
R: Replacement Parts
RL: Apply rubber lubricant.

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4-4 COOLING SYSTEM

Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump (coupled with the oil pump) turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is below 67°C (153°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 69.5 ~ 72.5°C (157 ~ 163°F), the thermostat opens and the coolant flows. When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the temperature is below 90°C (194°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contract, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

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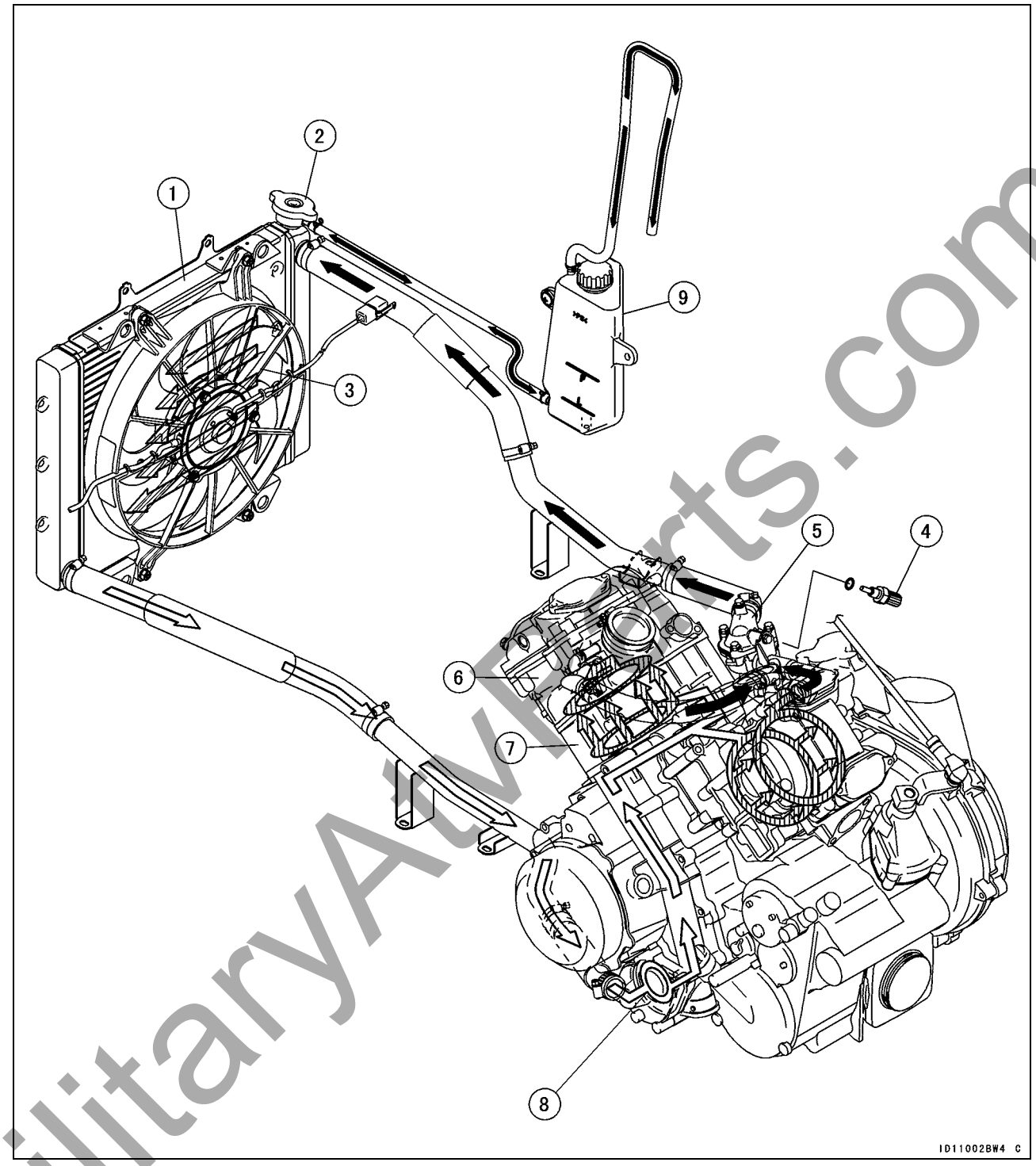
Coolant Flow Chart



1. Radiator
2. Radiator Cap
3. Radiator Fan
4. Water Temperature Sensor
5. Thermostat
6. Cylinder Head
7. Cylinder
8. Water Pump
9. Reserve Tank

Black Painted Arrow: Hot Coolant
White Painted Arrow: Cold Coolant

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4-6 COOLING SYSTEM

Specifications

Item	Standard	Service Limit
Coolant Provided when Shipping		
Type	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators)	– – –
Color	Green	– – –
Mixed Ratio	Soft water 50%, coolant 50%	– – –
Freezing Point	−35°C (−31°F)	– – –
Total Amount	4.4 L (4.7 US qt) (reserve tank full level including radiator and engine)	– – –
Radiator Cap		
Relief Pressure	93 ~123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)	– – –
Thermostat		
Valve Opening Temperature	69.5 ~ 72.5°C (157 ~ 163°F)	– – –
Valve Full Opening Lift	8 mm (0.31 in.) or more @85°C (185°F)	– – –

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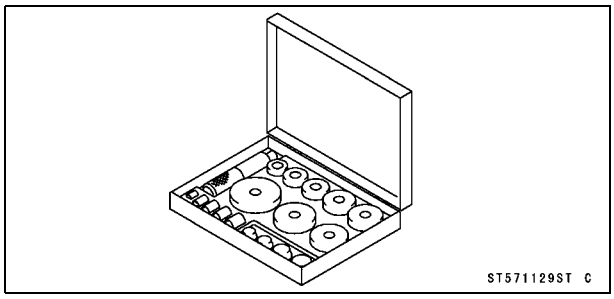
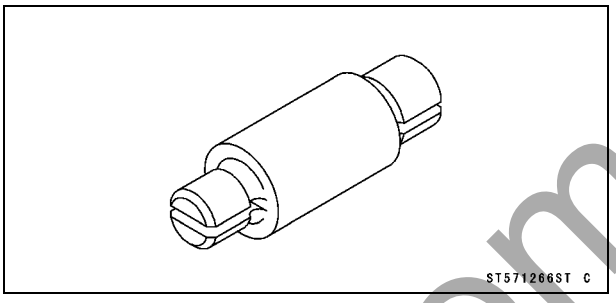
Special Tools

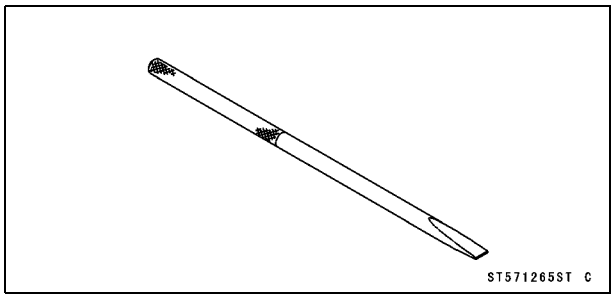
Bearing Driver Set:
57001-1129



Bearing Remover Head, ϕ10 × ϕ12:
57001-1266



Bearing Remover Shaft, ϕ9:
57001-1265



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Coolant

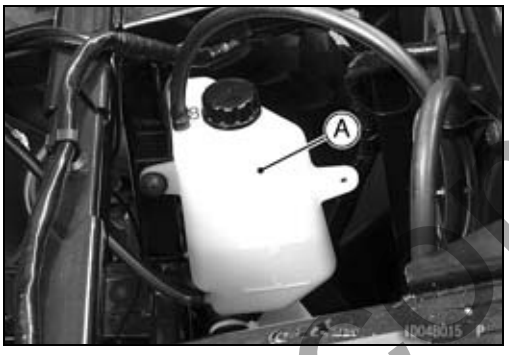
Coolant Deterioration Inspection

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).

- Visually inspect the coolant in the reserve tank [A].

★If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

★If the coolant gives off an abnormal smell, check for cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

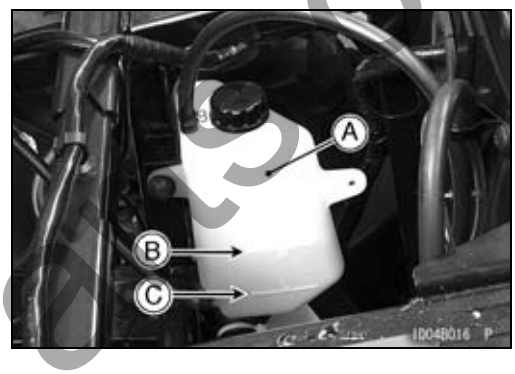


Coolant Level Inspection

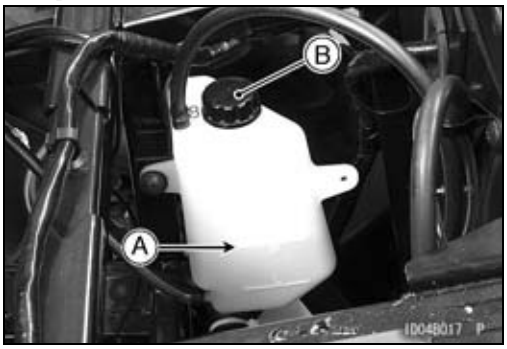
NOTE

○*Check the level when the engine is cold (room or ambient temperature).*

- Check the coolant level in the reserve tank with the vehicle held perpendicularly.
  Reserve Tank [A]
  F (full) Mark [B]
  L (low) Mark [C]



- If the coolant level is lower than the L mark [A], remove the reserve tank cap [B], then add coolant to the F mark [A].



NOTICE

For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attach the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.
If coolant must be added often, or the reserve tank has run completely dry; there is probably leakage in the cooling system. Check the system for leaks.

Coolant Draining

- Refer to the Coolant Change in the Periodic Maintenance chapter.

Coolant Filling

- Refer to the Coolant Change in the Periodic Maintenance chapter.

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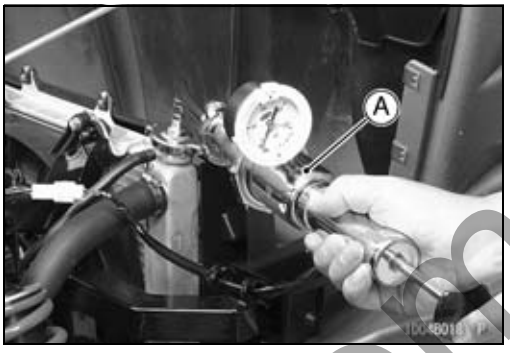
Coolant

Pressure Testing



- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove the radiator cap, and install a cooling system pressure tester [A] on the radiator filler neck.

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.*

- Build up pressure in the system carefully until the pressure reaches 123 kPa (1.25 kgf/cm², 18 psi).

NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 123 kPa (1.25 kgf/cm², 18 psi).

- Watch the gauge for at least 6 seconds.

★If the pressure holds steady, the system is alright.

★If the pressure drops soon, check for leaks.

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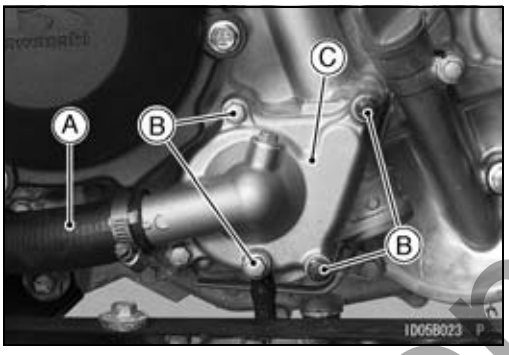
Water Pump

Water Pump Cover Removal

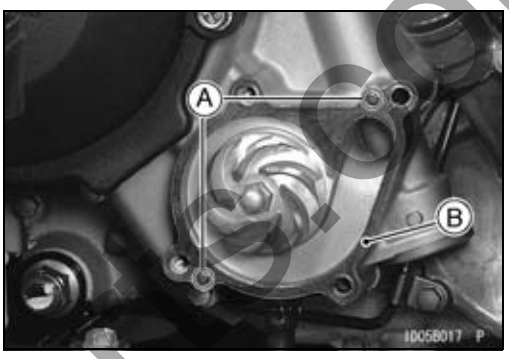
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Left Cover (see Left Cover Removal in the Frame chapter)
  Water Hose [A]
  Water Pump Cover Bolts [B]
  Water Pump Cover [C]



Water Pump Cover Installation

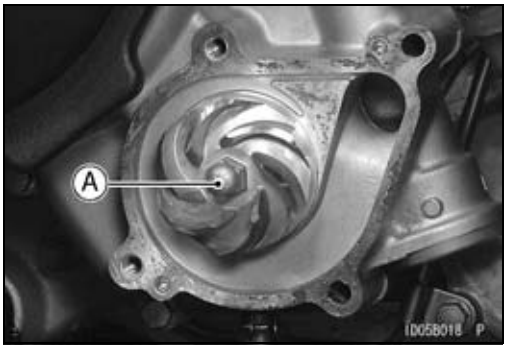
- Install:
  Dowel Pins [A]
  New Gasket [B]
- Tighten:

Torque - Water Pump Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



Water Pump Impeller Removal

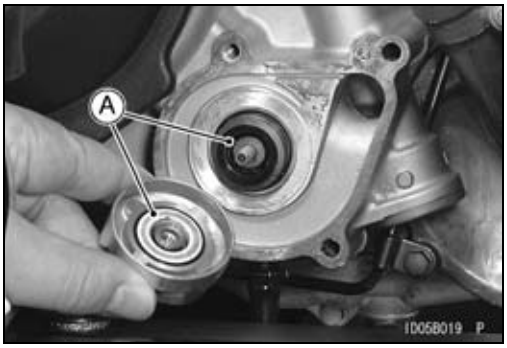
- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Water Pump Cover (see Water Pump Cover Removal)
- Loosen the water pump impeller [A] counterclockwise.



Water Pump Impeller Installation

- Apply a small amount of coolant on the sliding surface [A] of the mechanical seal and the sealing seat.
- Install the impeller on the water pump shaft and tighten the impeller.

Torque - Water Pump Impeller: 7.8 N·m (0.80 kgf·m, 69 in·lb)



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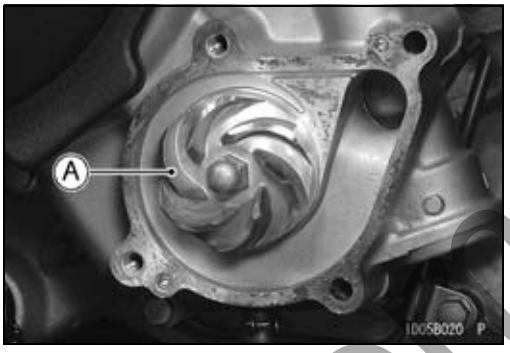
Water Pump

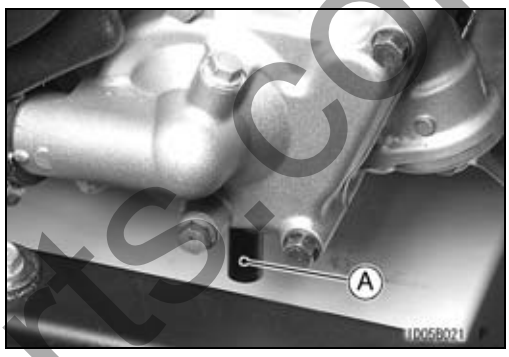
Water Pump Impeller Inspection



- Visually inspect the impeller [A].

★If the surface is corroded or the blades are damaged, replace the impeller.

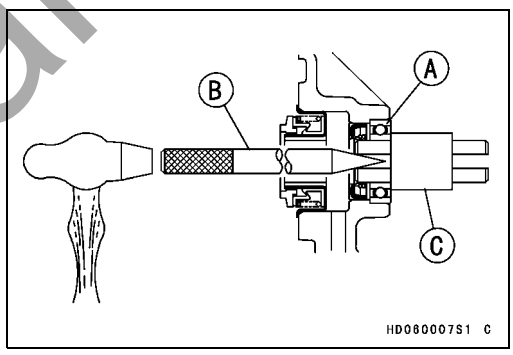
Water Pump Leakage Inspection



- Check the drainage tube [A] at the bottom of the water pump body for coolant leakage.

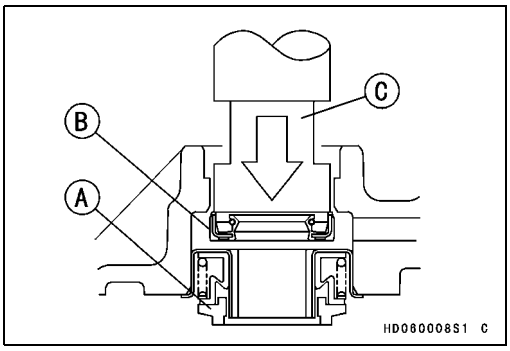
★If there is a coolant leak, the mechanical seal in the pump could be damaged. Replace the mechanical seal with a new one (see Mechanical Seal Replacement).

Mechanical Seal Replacement



- Remove:
  Water Pump Impeller (see Water Pump Impeller Removal)
  Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
- Take the bearing [A] out of the alternator cover, using the bearing remover.

Special Tools - Bearing Remover Shaft, ϕ9 [B]: 57001-1265
Bearing Remover Head, ϕ10 × ϕ12 [C]: 57001-1266



- Press out the mechanical seal [A] and oil seal [B] from the inside of the alternator cover with the bearing driver set [C].

Special Tool - Bearing Driver Set: 57001-1129

NOTICE

If either the mechanical seal, oil seal, or the ball bearing is removed, make sure to replace all of them simultaneously with a new one.
Be careful not to block the inspection hole with the oil seal. If the inspection hole is blocked, the coolant may pass through the oil seal and flow into the crankcase.

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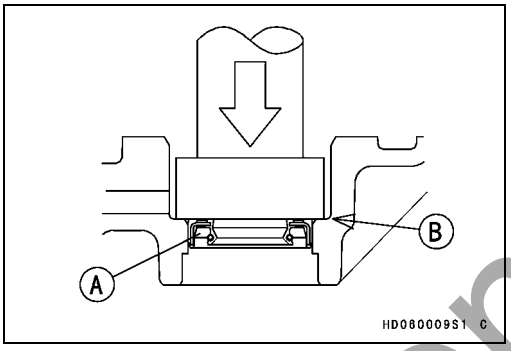
Water Pump

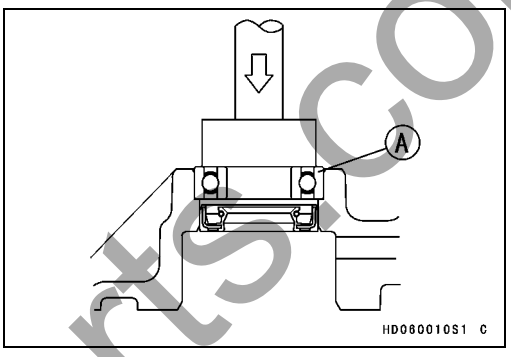
- Apply heat-resistance grease on the oil seal lip.
- From outside the alternator cover, press and insert the oil seal [A] so that its surface is flush with the step portion [B] of the cover as shown.

Special Tool - Bearing Driver Set: 57001-1129



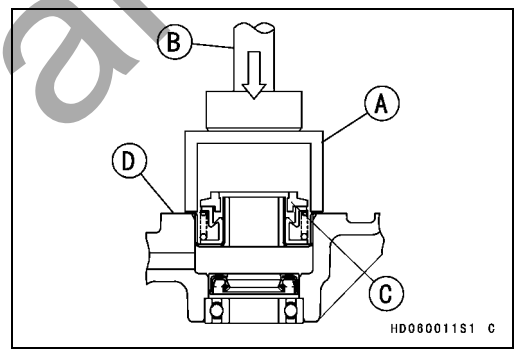
- From inside the alternator cover, press and insert the ball bearing [A] until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129



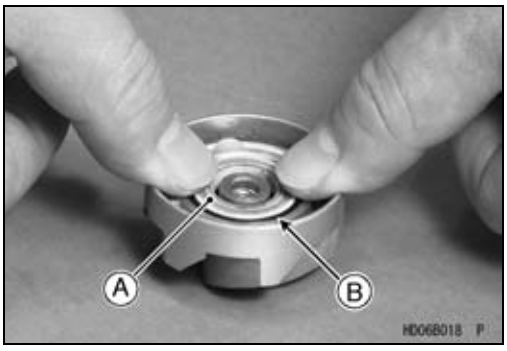
- Using a suitable socket [A] and the bearing driver [B], press and insert a new mechanical seal [C] until its flange stops at the step [D] of the hole.

Special Tool - Bearing Driver Set: 57001-1129



- Clean the sliding surface of a new mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
- Apply coolant to the surfaces of the rubber seal and sealing seat [A], and press the rubber seal [B] and sealing seat into the impeller by hand until the seat bottoms out.
- Tighten the water pump impeller by turning the bolt clockwise.

Torque - Water Pump Impeller: 7.8 N·m (0.80 kgf·m, 69 in·lb)



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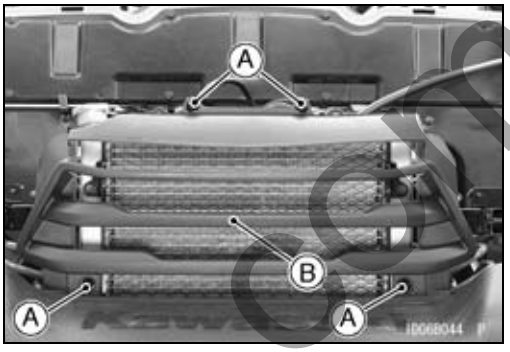
Radiator

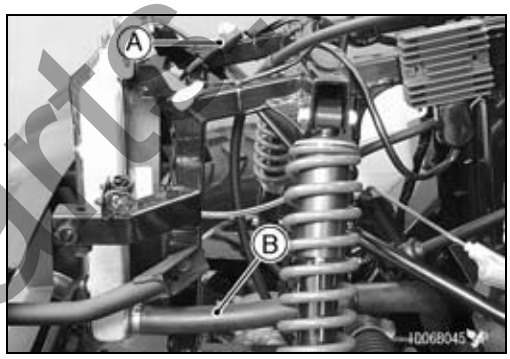
Radiator Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove the front fender front (see Front Fender Front Removal in the Frame chapter).

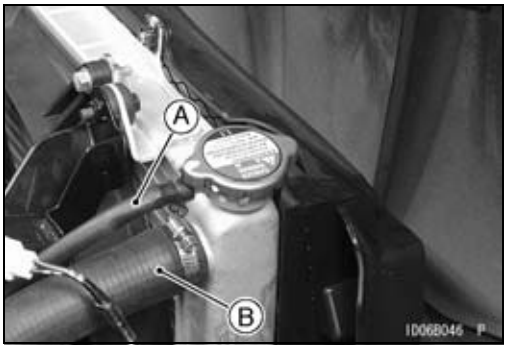
- Remove:
  Radiator Cover Mounting Screws [A]
  Radiator Cover [B]



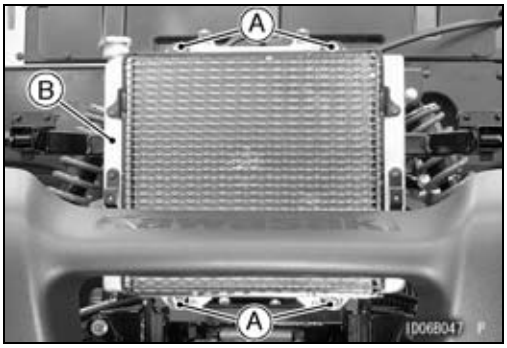
- Remove:
  Radiator Fan Motor Lead Connector [A]
  Water Hose [B]



- Remove:
  Reserve Tank Hose [A]
  Water Hose [B]



- Remove:
  Radiator Bolts [A]
  Radiator [B]



NOTICE

Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.

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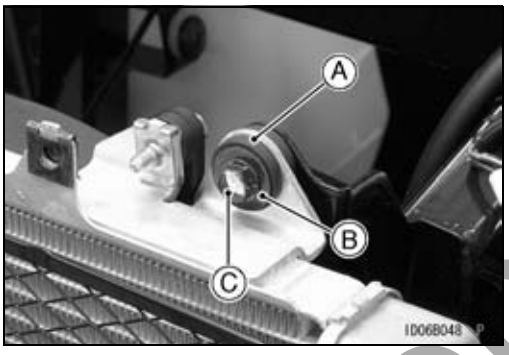
Radiator

Radiator Installation



- Install:
  Dampers [A]
  Collars [B]
- Tighten:

Torque - Radiator Mounting Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

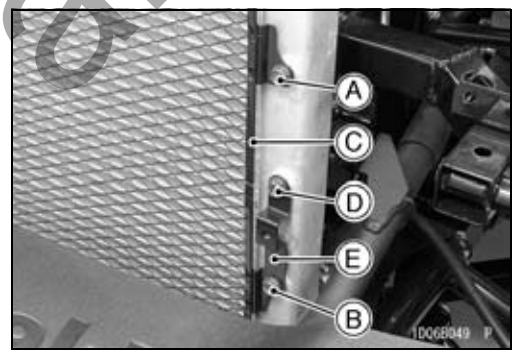
- Connect:
  Radiator Fan Motor Lead Connector
- Install the fan motor breather hose.

NOTE

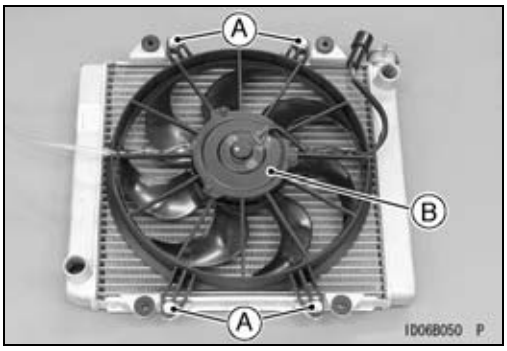
○*Do not apply lubricant at fitting hose region.*

- Install:
  Water Hoses
  Reserve Tank Hose
- Run the hoses according to the Cable, Wire, and Hose Routing section in the Appendix chapter.

Radiator Fan Removal



- Remove:
  Radiator Cover (see Radiator Removal)
  Radiator Screen Mounting Bolts [A] (both side)
  Radiator Screen and Radiator Cover Bracket Mounting Bolts [B] (both side)
  Radiator Screen [C]
  Radiator Cover Bracket Mounting Bolts [D] (both side)
  Radiator Cover Bracket [E] (both side)



- Remove:
  Radiator (see Radiator Removal)
  Radiator Fan Assembly Bolts [A]
  Fan Assembly [B]

Radiator Fan Installation

- Install:
  Radiator Fan Assembly
- Tighten:

Torque - Radiator Fan Assembly Bolts: 8.3 N·m (0.85 kgf·m, 73 in·lb)

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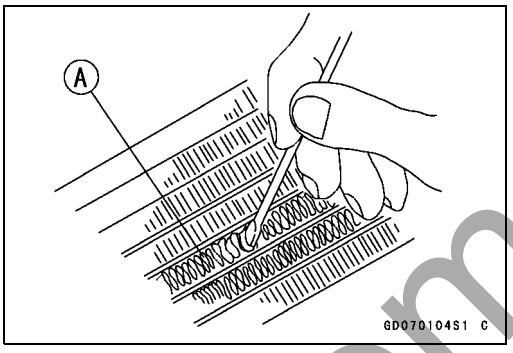
Radiator

Radiator Inspection



- Check the radiator core.

★If there are obstructions to air flow, remove the radiator and remove obstructions.

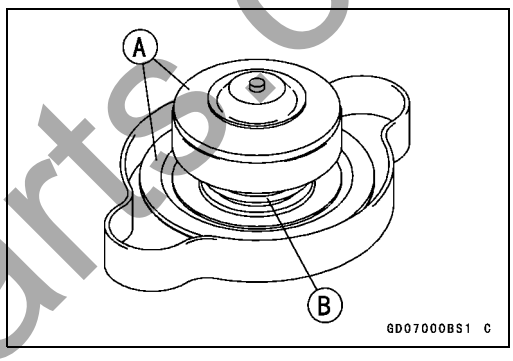
★If the corrugated fins [A] are deformed, carefully straighten them.

★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.

Radiator Cleaning

- Refer to the Radiator Cleaning in the Periodic Maintenance chapter.

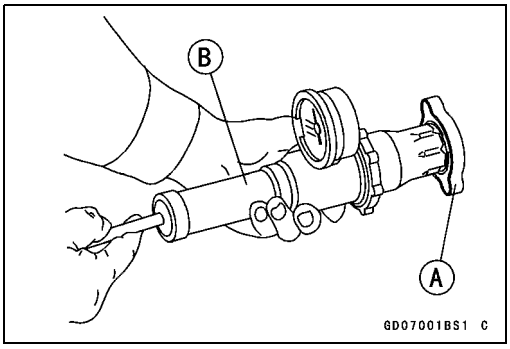
Radiator Cap Inspection



- Check the condition of the top and bottom valve seals of the radiator cap.

★If any one of them shows visible damage, replace the cap.

Top and Bottom Valve Seals [A]
Valve Spring [B]



- Install the cap [A] on a cooling system pressure tester [B].

NOTE

○*Wet the cap sealing surfaces with water or coolant to prevent pressure leakage.*

- Watching the pressure gauge, slowly pump the pressure tester to build up the pressure. The relief valve opens, indicated by the gauge hand flicks downward.

○The relief valve must open within the relief pressure range in the table below and the gauge hand must remain within the specified range at least 6 second.

Radiator Cap Relief Pressure
Standard: 93 ~ 123 kPa (0.95 ~ 1.25 kgf/cm², 13 ~ 18 psi)

★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

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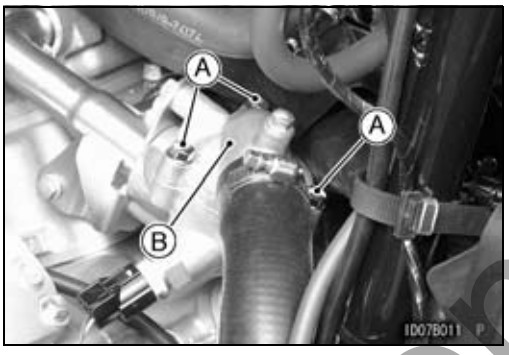
Thermostat

Thermostat Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Fuel Hose (see Fuel Hose Replacement in the Periodic Maintenance chapter)
  Thermostat Housing Cover Bolts [A]
  Thermostat Housing Cover [B]
  Thermostat

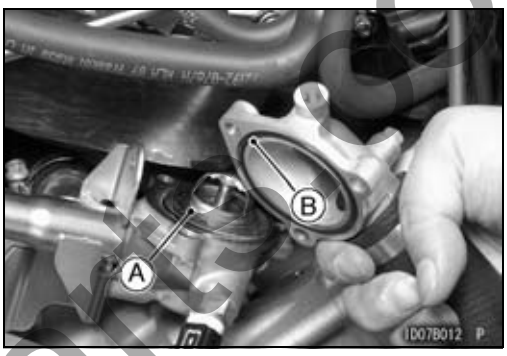


Thermostat Installation

- Install:
  Thermostat [A]
- Be sure to install the O-ring [B] on the housing cover.
- Tighten:

  Torque - Thermostat Housing Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

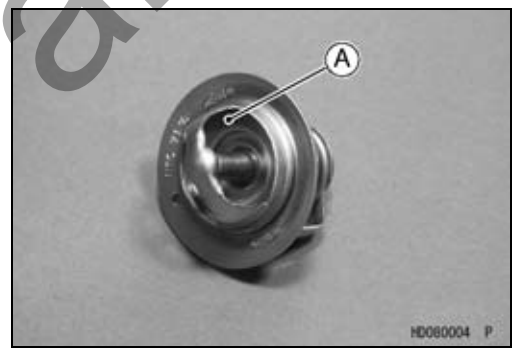
- Add coolant (see Coolant Change in the Periodic Maintenance chapter).



Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve [A] at room temperature.

★If the valve is open, replace the valve with a new one.



- To check valve opening temperature, suspend the thermostat [A] and an accurate thermometer [B] in a container of water with the heat-sensitive portions [C] in almost the same depth.

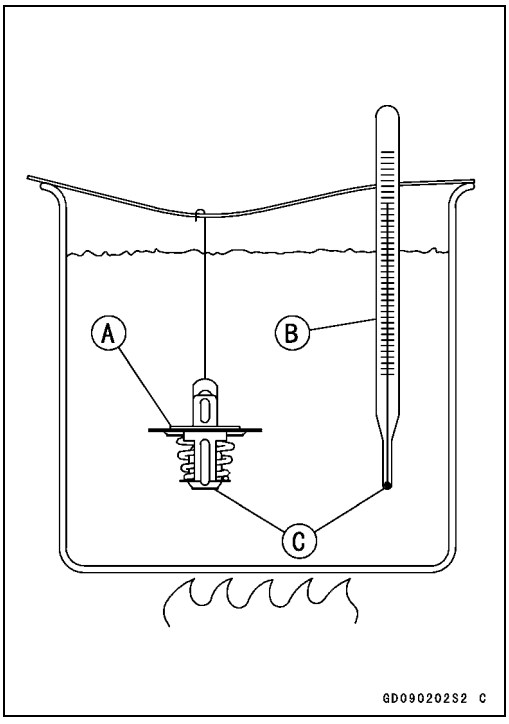
NOTE

○*The thermostat must be completely submerged and the thermostat and thermometer must not touch the container sides or bottom.*

- Gradually raise the temperature of the water while stirring the water gently for even temperature.

★If the measurement is out of the specified range, replace the thermostat.

Thermostat Valve Opening Temperature
69.5 ~ 72.5°C (157 ~ 163°F)



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Water Temperature Sensor

Water Temperature Sensor Removal/Installation

NOTICE
The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to water temperature sensor can damage it.

- Refer to the Water Temperature Sensor Removal/Installation in the Fuel System (DFI) chapter.

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection in the Fuel System (DFI) System chapter.

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Engine Top End

Table of Contents

Exploded View 5-2
Specifications 5-8
Special Tools and Sealant 5-11
Camshaft Chain Tensioner 5-13
  Camshaft Chain Tensioner Removal 5-13
  Camshaft Chain Tensioner Installation 5-13
Rocker Case 5-15
  Rocker Case Removal 5-15
  Rocker Case Installation 5-16
  Rocker Arm Removal 5-17
  Rocker Arm Installation 5-18
  Rocker Arm Inspection 5-18
  Rocker Shaft Diameter Measurement 5-18
Camshaft 5-19
  Camshaft Removal 5-19
  Camshaft Installation 5-19
  Camshaft Assembly 5-20
  Cam Wear Inspection 5-20
  Camshaft Bearing Wear Inspection 5-21
  KACR Inspection 5-22
  KACR Removal 5-22
  KACR Installation 5-23
  Camshaft Chain Removal 5-23
  Camshaft Chain Installation 5-24
  Camshaft Chain Guide Wear Inspection 5-27
Cylinder Head 5-28
  Cylinder Compression Measurement 5-28
  Cylinder Head Removal 5-29
  Cylinder Head Installation 5-29
  Cylinder Head Cleaning 5-30
  Cylinder Head Warp Inspection 5-30
Valves 5-31
  Valve Clearance Inspection 5-31
  Valve Clearance Adjustment 5-31
  Valve Removal 5-31
  Valve Installation 5-31
  Valve Guide Removal 5-31
  Valve Guide Installation 5-32
  Valve-to-Guide Clearance Measurement 5-32
  Valve Seat Inspection 5-33
  Valve Seat Repair (Valve Lapping) 5-33
Cylinder and Piston 5-38
  Cylinder Removal 5-38
  Piston Removal 5-38
  Cylinder, Piston Installation 5-38
  Cylinder Wear Inspection 5-40
  Piston Wear Inspection 5-40
  Piston/Cylinder Clearance Inspection 5-40
  Piston Ring, Piston Ring Groove Wear Inspection 5-41
  Piston Ring Groove Width Inspection 5-41
  Piston Ring Thickness Inspection 5-41
  Piston Ring End Gap Inspection .. 5-42
Exhaust System 5-43
  Spark Arrester Cleaning 5-43
  Muffler and Exhaust Pipe Removal 5-43
  Exhaust System Inspection 5-45
  Muffler and Exhaust Pipe Installation 5-45

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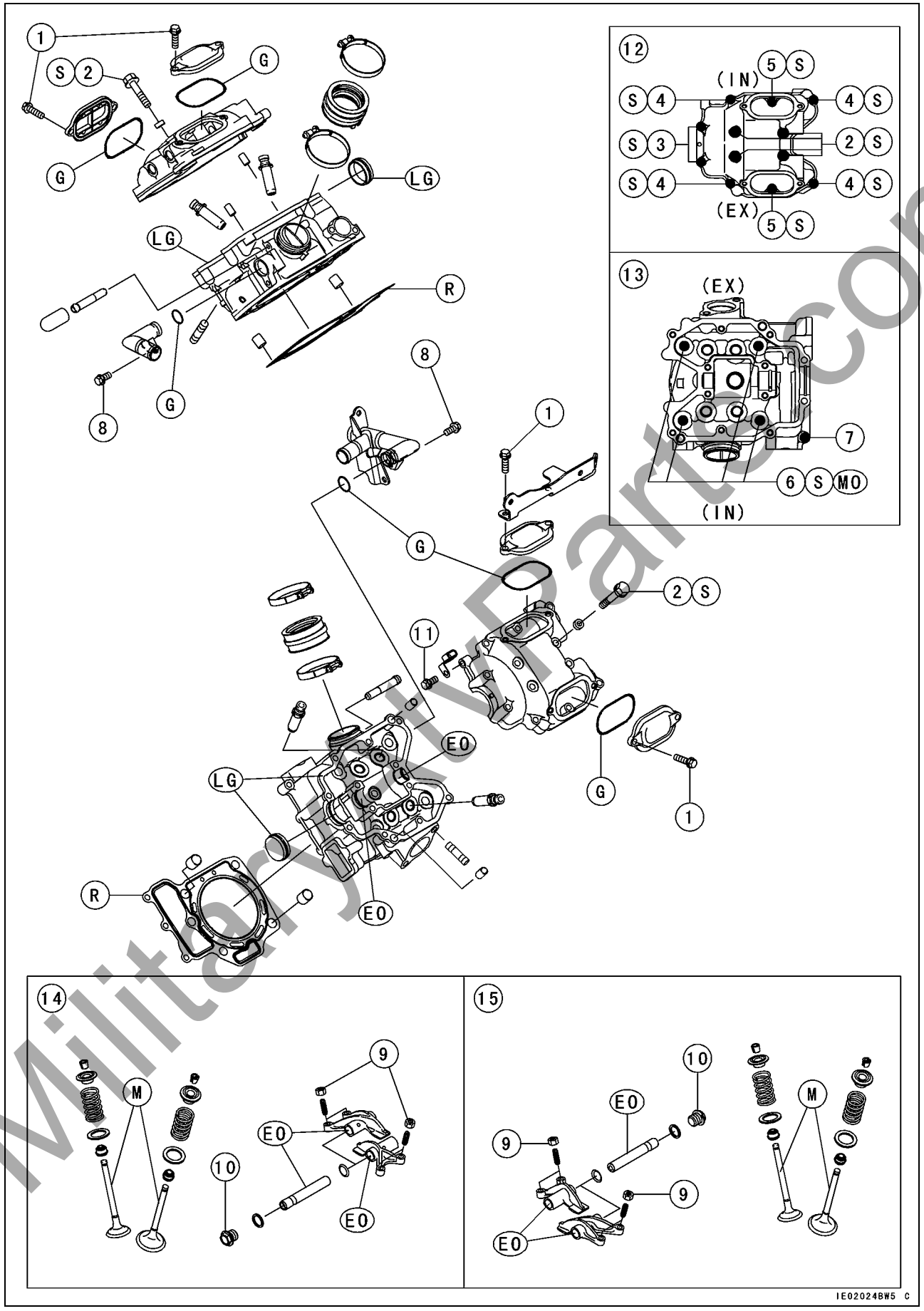
5-2 ENGINE TOP END

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Valve Adjusting Cap Bolts	8.8	0.90	78 in·lb	
2	Rocker Case Bolts, L = 55 mm (2.2 in.)	8.8	0.90	78 in·lb	S
3	Rocker Case Bolts, L = 130 mm (5.1 in.)	9.8	1.0	87 in·lb	S
4	Rocker Case Bolts, L = 30 mm (1.2 in.)	9.8	1.0	87 in·lb	S
5	Rocker Case Bolts, L = 25 mm (1.0 in.)	9.8	1.0	87 in·lb	S
6	Cylinder Head Bolts (M10), first torque	25	2.5	18	S, MO
6	Cylinder Head Bolts (M10), final torque	49	5.0	36	S
7	Cylinder Head Bolts (M6)	9.8	1.0	87 in·lb	
8	Water Pipe Mounting Bolts	8.8	0.90	78 in·lb	
9	Valve Adjusting Screw Locknuts	12	1.2	106 in·lb	
10	Rocker Shaft Bolts	22	2.2	16	
11	Rear Rocker Case Clamp Bolt	8.8	0.90	78 in·lb	

12. Rocker Case
13. Cylinder Head
14. Front
15. Rear

EO: Apply engine oil.
G: Apply grease.
LG: Apply liquid gasket (Liquid Gasket, TB1216: 92104-1063).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution
(mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1).
R: Replacement Parts
S: Follow the specific tightening sequence.

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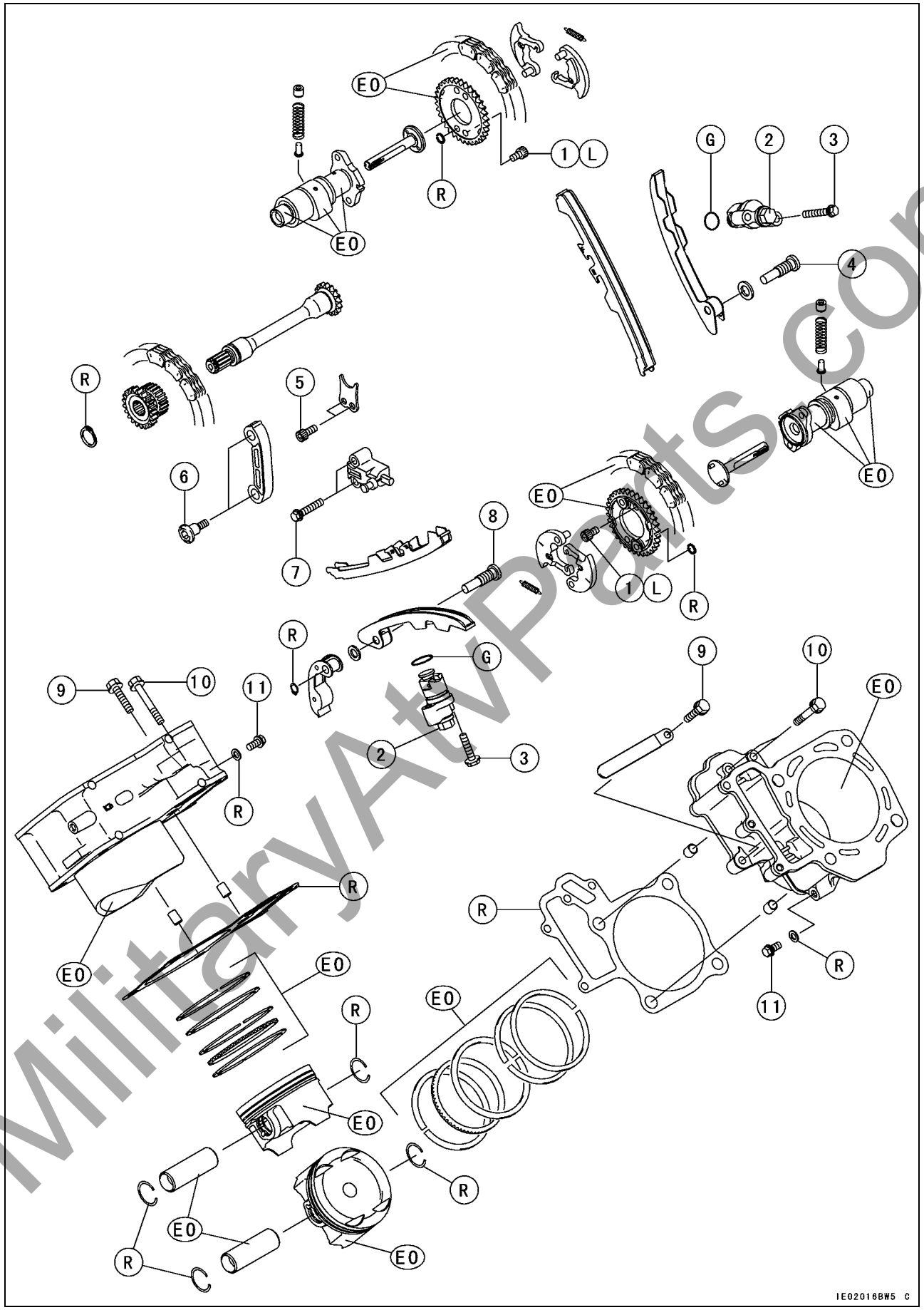
5-4 ENGINE TOP END

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Camshaft Sprocket Bolts	12	1.2	106 in·lb	L
2	Chain Tensioner Cap Bolts	22	2.2	16	
3	Chain Tensioner Mounting Bolts	8.8	0.90	78 in·lb	
4	Front Cylinder Camshaft Chain Guide Bolt	20	2.0	15	
5	Position Plate Bolts	8.8	0.90	78 in·lb	
6	Intermediate Shaft Chain Guide Bolts	8.8	0.90	78 in·lb	
7	Intermediate Shaft Chain Tensioner Bolts	8.8	0.90	78 in·lb	
8	Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	15	
9	Cylinder Bolts, L = 30 mm (1.2 in.)	9.8	1.0	87 in·lb	
10	Cylinder Bolts, L = 40 mm (1.6 in.)	9.8	1.0	87 in·lb	
11	Coolant Drain Plugs (Cylinder)	7.0	0.71	62 in·lb	

EO: Apply engine oil.
G: Apply grease for oil seal and O-ring.
L: Apply a non-permanent locking agent.
R: Replacement Parts

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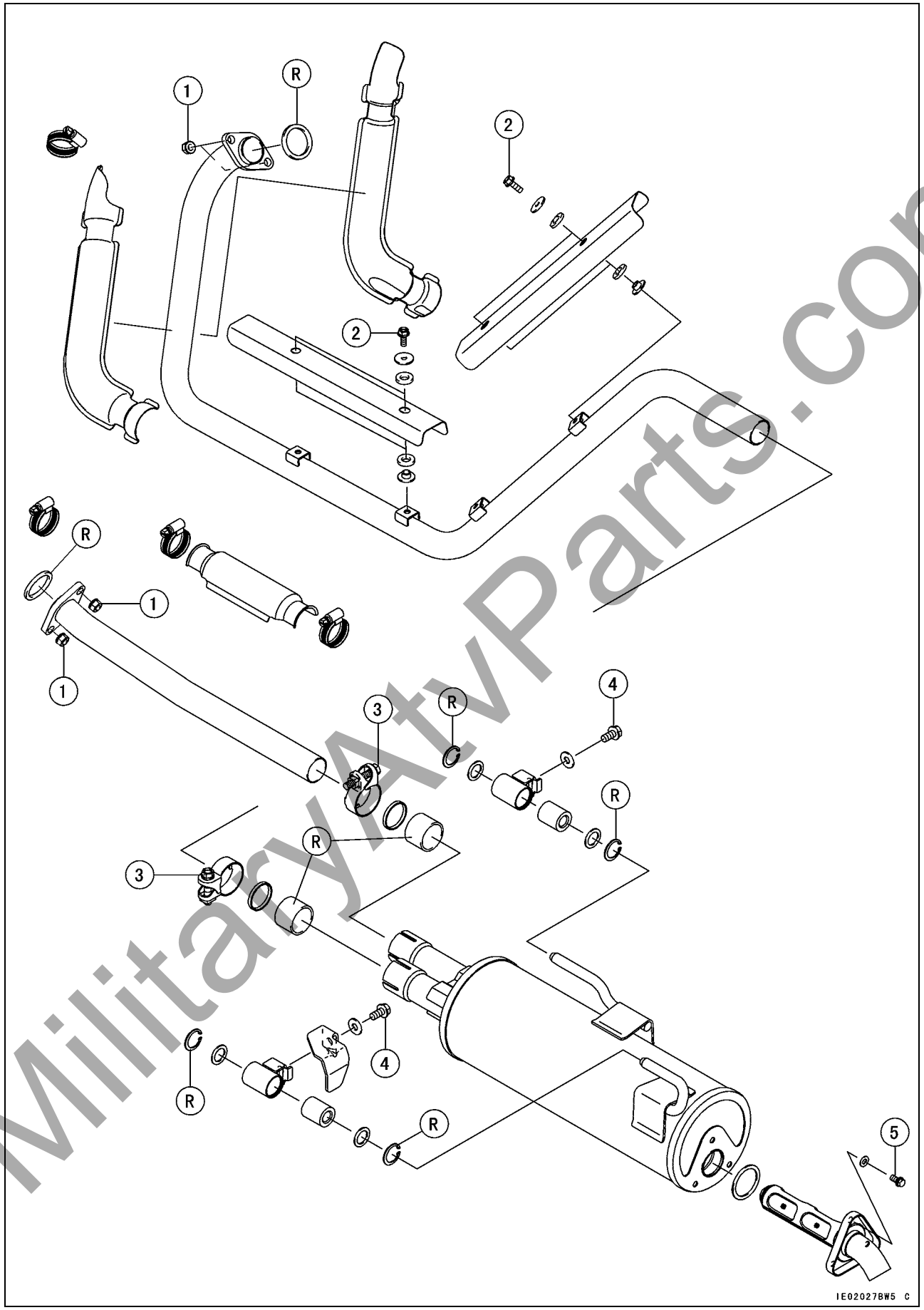
5-6 ENGINE TOP END

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Exhaust Pipe Nuts	17	1.7	13	
2	Exhaust Pipe Cover Bolts	13	1.3	115 in·lb	
3	Muffler Clamp Bolts	15	1.5	11	
4	Muffler Mounting Bolts	28	2.9	21	
5	Spark Arrester Mounting Bolts	13	1.3	115 in·lb	

R: Replacement Parts

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Specifications

Item	Standard	Service Limit
Rocker Case		
Rocker Arm Inside Diameter	12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in.)	12.05 mm (0.474 in.)
Rocker Shaft Diameter	11.983 ~ 11.994 mm (0.4718 ~ 0.4722 in.)	11.96 mm (0.471 in.)
Camshafts		
Cam Height:		
Exhaust	35.363 ~ 35.477 mm (1.3922 ~ 1.3967 in.)	35.26 mm (1.388 in.)
Inlet	35.622 ~ 35.736 mm (1.4024 ~ 1.4069 in.)	35.52 mm (1.398 in.)
Camshaft Bearing Clearance:		
ϕ18	0.016 ~ 0.052 mm (0.0006 ~ 0.0020 in.)	0.14 mm (0.0055 in.)
ϕ22	0.020 ~ 0.059 mm (0.0008 ~ 0.0023 in.)	0.15 mm (0.0059 in.)
Camshaft Journal Diameter:		
ϕ18	17.966 ~ 17.984 mm (0.7073 ~ 0.7080 in.)	17.94 mm (0.706 in.)
ϕ22	21.959 ~ 21.980 mm (0.8645 ~ 0.8654 in.)	21.93 mm (0.863 in.)
Camshaft Bearing Inside Diameter:		
ϕ18	18.000 ~ 18.018 mm (0.7087 ~ 0.7094 in.)	18.08 mm (0.712 in.)
ϕ22	22.000 ~ 22.018 mm (0.8661 ~ 0.8668 in.)	22.08 mm (0.869 in.)
Camshaft runout	TIR 0.02 mm (0.0008 in.) or less	TIR 0.1 mm (0.0039 in.)
KACR (Kawasaki Automatic Compression Release):		
KACR Operating Engine Speed	760 ±30 r/min (rpm)	– – –
Cylinder Head		
Cylinder Compression (Usable Range)		
Electric Starter	251 ~ 456 kPa (2.56 ~ 4.65 kgf/cm², 36 ~ 66 psi) @380 r/min (rpm)	– – –
Cylinder head warp	– – –	0.05 mm (0.002 in.)
Valve		
Valve Clearance:		
Exhaust	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in.)	– – –
Inlet	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in.)	– – –
Valve Head Thickness:		
Exhaust	0.8 mm (0.031 in.)	0.4 mm (0.016 in.)
Inlet	0.5 mm (0.020 in.)	0.3 mm (0.012 in.)
Valve Stem Bend	TIR 0.01 mm (0.0004 in.) or less	TIR 0.05 mm (0.002 in.)

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Specifications

Item	Standard	Service Limit
Valve Stem Diameter:		
Exhaust	4.955 ~ 4.970 mm (0.1951 ~ 0.1957 in.)	4.94 mm (0.1945 in.)
Inlet	4.975 ~ 4.990 mm (0.1959 ~ 0.1965 in.)	4.96 mm (0.1953 in.)
Valve Guide Inside Diameter:		
Exhaust	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.20 in.)
Inlet	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in.)	5.08 mm (0.20 in.)
Valve/Valve Guide Clearance (Wobble Method):		
Exhaust	0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)	0.37 mm (0.0146 in.)
Inlet	0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)	0.31 mm (0.0122 in.)
Valve Seat Cutting Angle	45°, 32°, 60°	– – –
Valve Seating Surface:		
Outside Diameter:		
Exhaust	25.2 ~ 25.4 mm (0.992 ~ 1.000 in.)	– – –
Inlet	29.4 ~ 29.6 mm (1.157 ~ 1.165 in.)	– – –
Width:		
Exhaust	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)	– – –
Inlet	0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)	– – –
Valve Spring Free Length:		
Exhaust	41.3 mm (1.626 in.)	39.5 mm (1.555 in.)
Inlet	41.3 mm (1.626 in.)	39.5 mm (1.555 in.)
Cylinder, Piston		
Cylinder Inside Diameter	84.994 ~ 85.006 mm (3.3462 ~ 3.3467 in.)	85.09 mm (3.3500 in.)
Piston Diameter	84.964 ~ 84.979 mm (3.3450 ~ 3.3456 in.)	84.81 mm (3.3390 in.)
Piston/Cylinder Clearance	0.015 ~ 0.042 mm (0.0006 ~ 0.0017 in.)	– – –
Piston Ring/Groove Clearance:		
Top	0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)	0.18 mm (0.0071 in.)
Second	0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)	0.17 mm (0.0067 in.)

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Specifications

Item	Standard	Service Limit
Piston Ring Groove Width:		
Top	1.03 ~ 1.05 mm (0.0406 ~ 0.0413 in.)	1.13 mm (0.0445 in.)
Second	1.02 ~ 1.04 mm (0.0402 ~ 0.0409 in.)	1.12 mm (0.0441 in.)
Piston Ring Thickness:		
Top	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.90 mm (0.0354 in.)
Second	0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)	0.90 mm (0.0354 in.)
Piston Ring End Gap:		
Top	0.15 ~ 0.25 mm (0.0059 ~ 0.0098 in.)	0.55 mm (0.0217 in.)
Second	0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)	0.75 mm (0.0295 in.)
Oil	0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)	1.00 mm (0.0394 in.)

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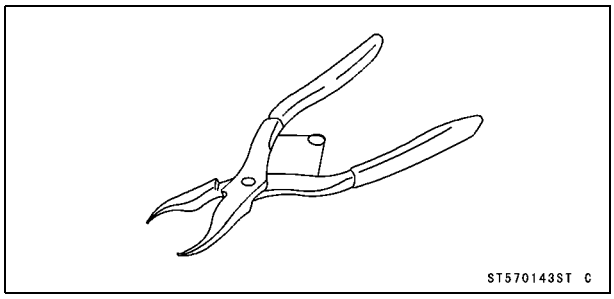
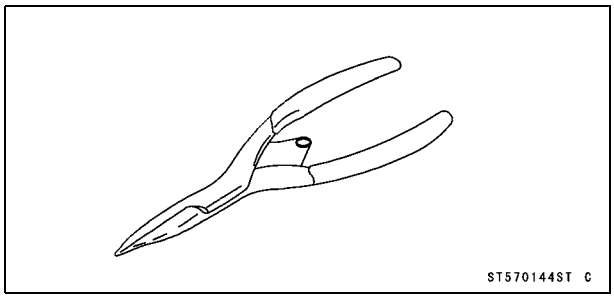
Special Tools and Sealant

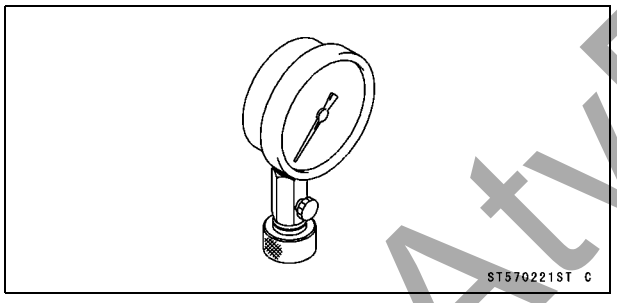
Inside Circlip Pliers:
57001-143



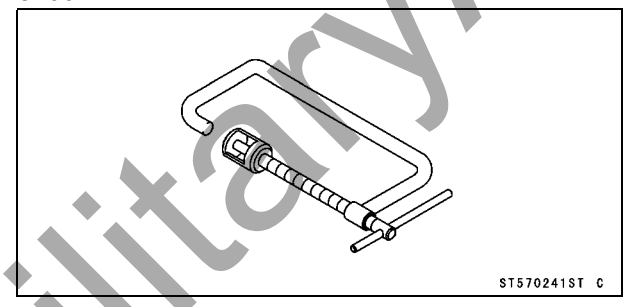
Outside Circlip Pliers:
57001-144



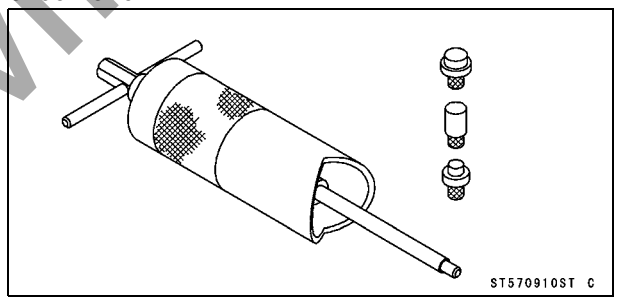
Compression Gauge, 20 kgf/cm²:
57001-221



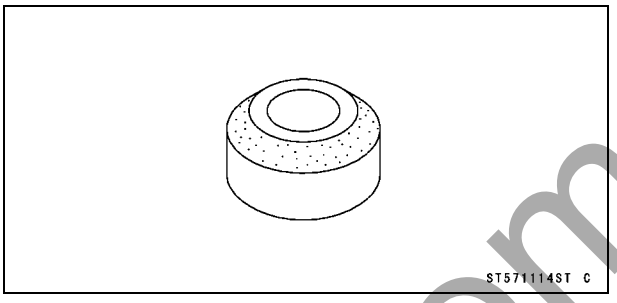
Valve Spring Compressor Assembly:
57001-241



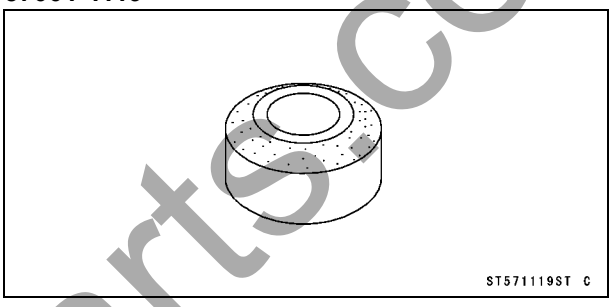
Piston Pin Puller Assembly:
57001-910



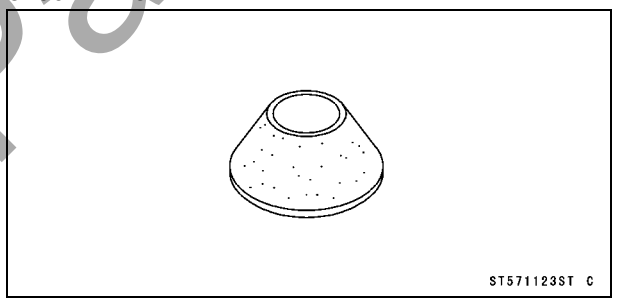
Valve Seat Cutter, 45° - ϕ27.5:
57001-1114



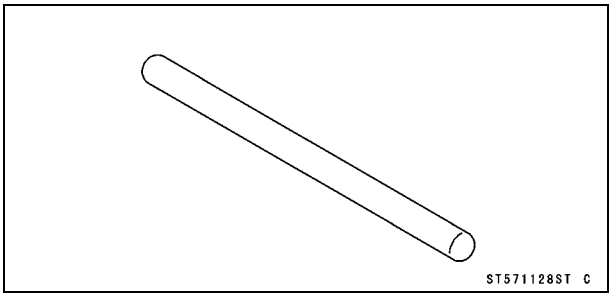
Valve Seat Cutter, 32° - ϕ28:
57001-1119



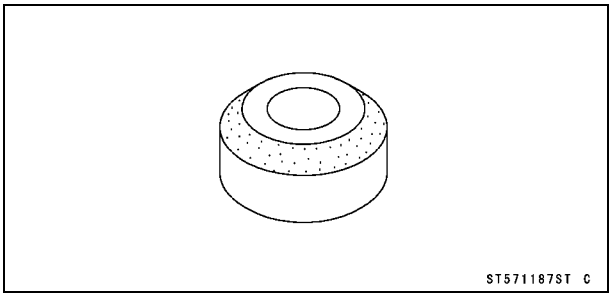
Valve Seat Cutter, 60° - ϕ30:
57001-1123



Valve Seat Cutter Holder Bar:
57001-1128



Valve Seat Cutter, 45° - ϕ30:
57001-1187



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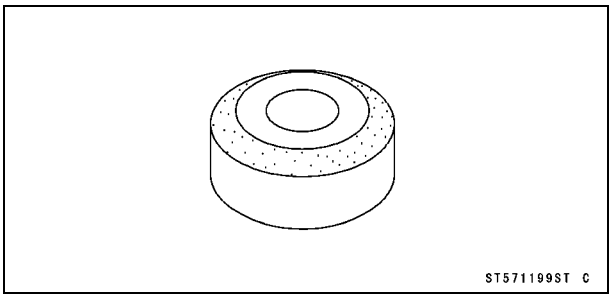
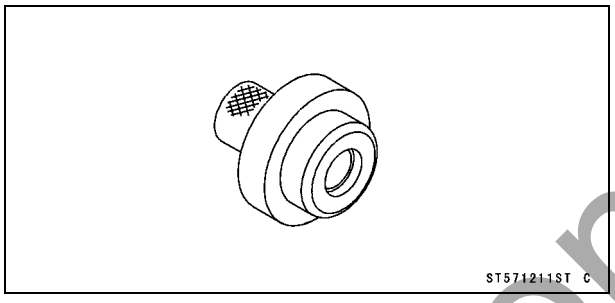
5-12 ENGINE TOP END

Special Tools and Sealant

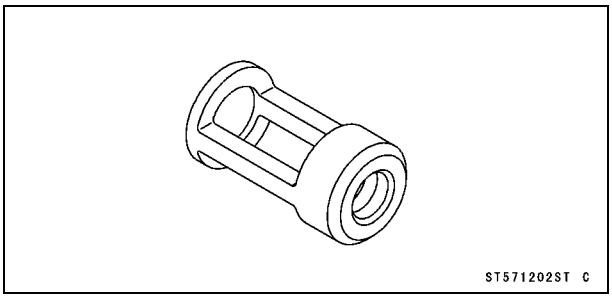
Valve Seat Cutter, 32° - ϕ33:
57001-1199



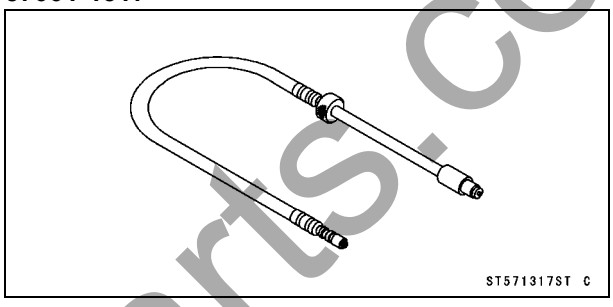
Piston Pin Puller Adapter, ϕ14:
57001-1211



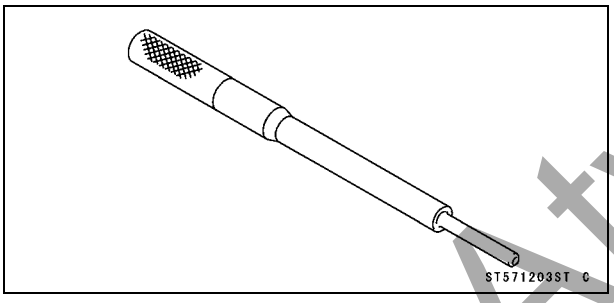
Valve Spring Compressor Adapter, ϕ22:
57001-1202



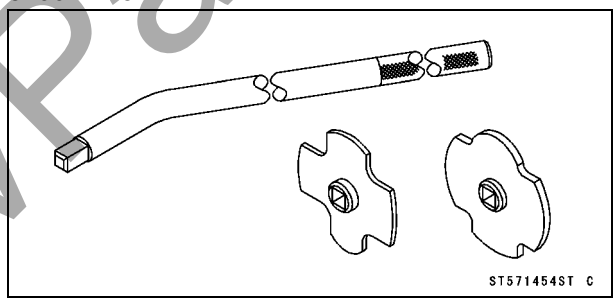
Compression Gauge Adapter, M10 × 1.0:
57001-1317



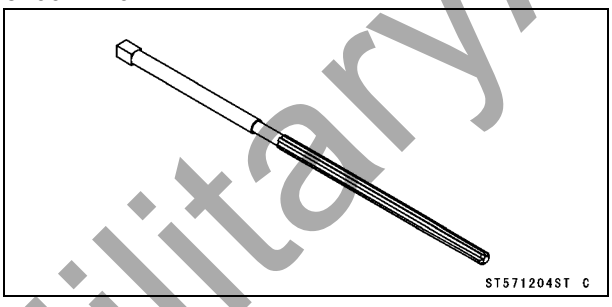
Valve Guide Arbor, ϕ5:
57001-1203



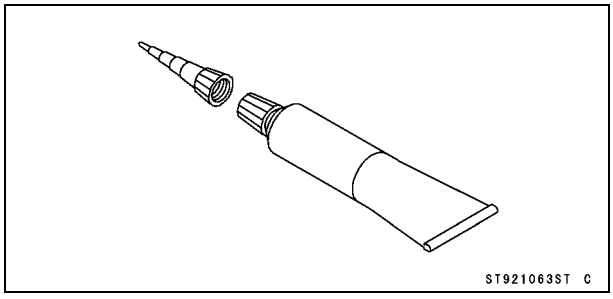
Filler Cap Driver:
57001-1454



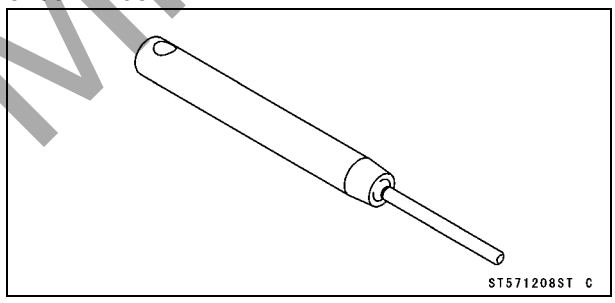
Valve Guide Reamer, ϕ5:
57001-1204



Liquid Gasket, TB1216:
92104-1063



Valve Seat Cutter Holder, ϕ5:
57001-1208



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Camshaft Chain Tensioner

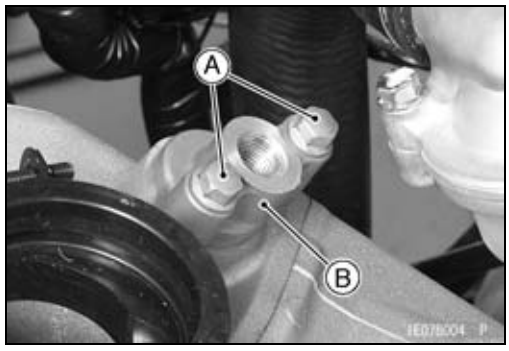
Camshaft Chain Tensioner Removal

NOTICE

This is a non-return type cam chain tensioner. The push rod does not return to its original position once it moves out to take up cam chain slack. Observe all the rules listed below:
When removing the tensioner, do not take out the mounting bolts only partway. Retightening the mounting bolts from this position could damage the tensioner and the camshaft chain. Once the bolts are loosened, the tensioner must be removed and reset as described in "Camshaft Chain Tensioner Installation".
Do not turn over the crankshaft while the tensioner is removed. This could upset the cam chain timing, and damage the valves.

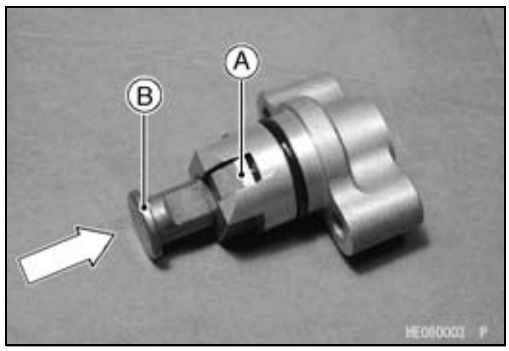
● Remove:
Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
Cap Bolt [A] and Washer
Pin and Spring

● Remove:
Tensioner Mounting Bolts [A]
Camshaft Chain Tensioner [B]



Camshaft Chain Tensioner Installation

● Push the stopper [A] to release the ratchet and push the push rod [B] into the tensioner body.



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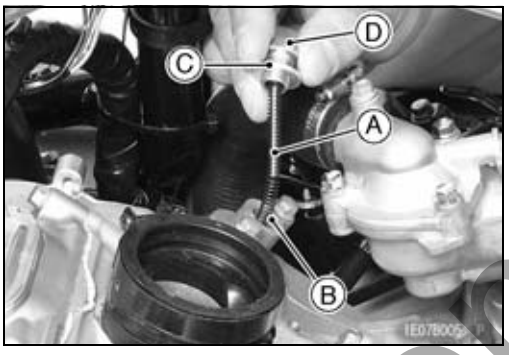
Camshaft Chain Tensioner



- Tighten:

  Torque - Chain Tensioner Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install:
  Pin [A] and Spring [B]
  Washer [C] and Chain Tensioner Cap Bolt [D]
- Tighten:

  Torque - Chain Tensioner Cap Bolt: 22 N·m (2.2 kgf·m, 16 ft·lb)

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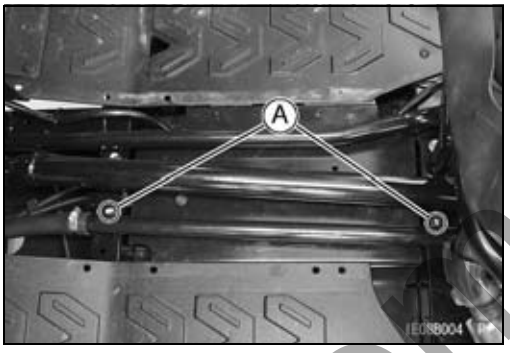
Rocker Case

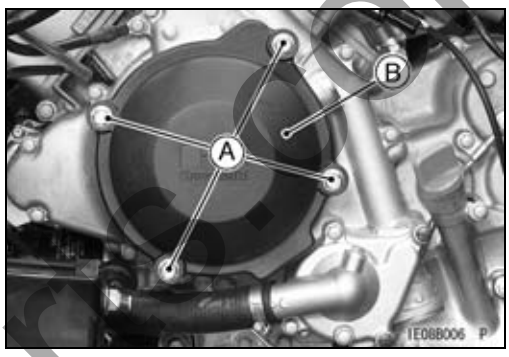
Rocker Case Removal

Front Rocker Case

- Remove:
  Center Bracket (see Center Bracket Removal in the Frame chapter)
  Right Water Pipe Bolts [A]

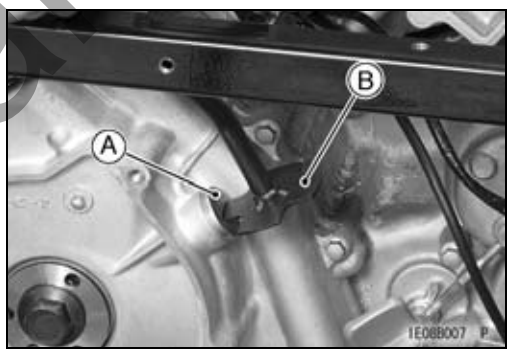


- Remove:
  Left Cover (see Left Cover Removal in the Frame chapter)
  Bolts [A] and Engine Left Cover [B]



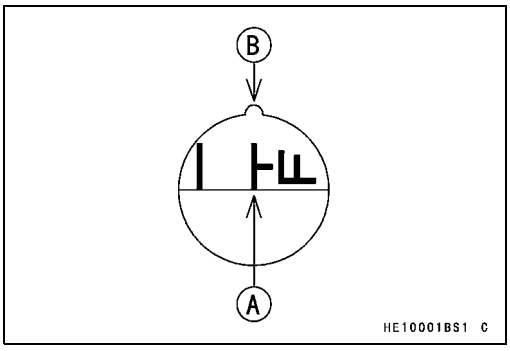
- Remove:
  Timing Inspection Plug [A]

  Special Tool - Filler Cap Driver [B]: 57001-1454



- Remove:
  Front Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Valve Adjusting Caps

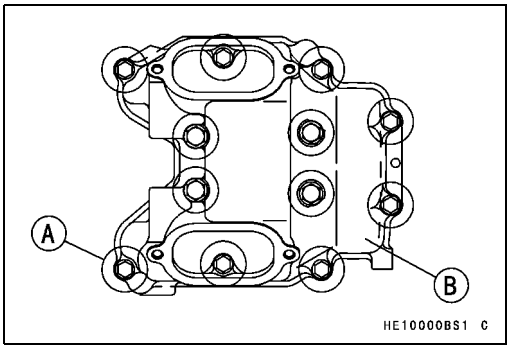
- Using a wrench on the alternator bolt, turn the crankshaft counterclockwise until “T-F” mark [A] is aligned with the notch [B] in the inspection window, and the cam lobes are pointing away from the rocker arms: the end of the compression stroke.



NOTICE

Be sure to position the crankshaft at TDC of the end of the compression stroke when removing or installing the rocker case. The rocker arms could bend the valves.

- Remove:
  Rocker Case Bolts [A]
- Lift the rocker case to clear of the dowel pins in the cylinder head and remove the front rocker case [B].



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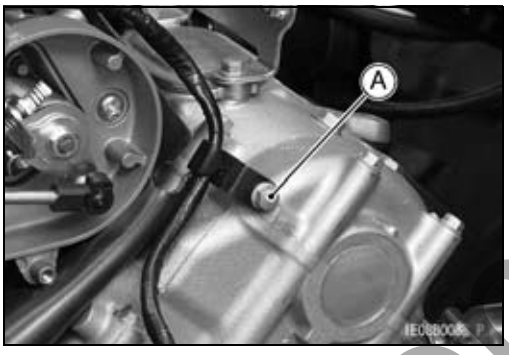
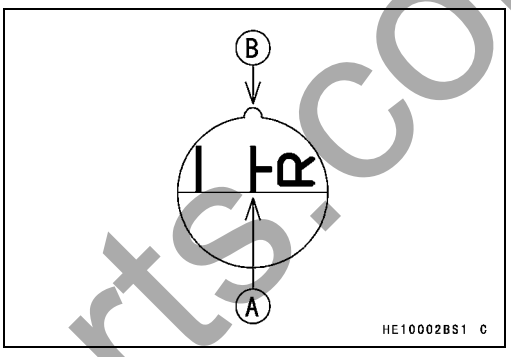
Rocker Case

Rear Rocker Case

- Remove:
  Front Rocker Case
  Air Cleaner Housing and Duct (see Air Cleaner Housing and Duct Removal in the Fuel System (DFI) chapter)
  Clamp Bolts [A]



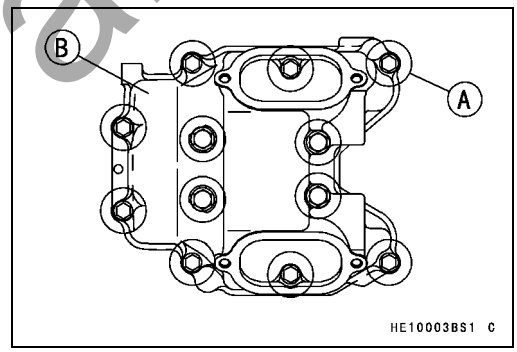
- Using a wrench on the alternator bolt, turn the crankshaft **counterclockwise** (270°) until "T-R" mark [A] is aligned with the notch [B] in the inspection window, and the cam lobes are pointing away from the rocker arms: the end of the compression stroke.



NOTICE

Be sure to position the crankshaft at TDC of the end of the compression stroke when removing or installing the rocker case. The rocker arms could bend the valves.

- Remove:
  Rear Camshaft Chain Tensioner (see Camshaft Chain Tensioner Removal)
  Rocker Case Bolts [A]
  Rear Rocker Case [B]
- Lift the rocker case to clear of the dowel pins in the cylinder head and remove the rocker case.



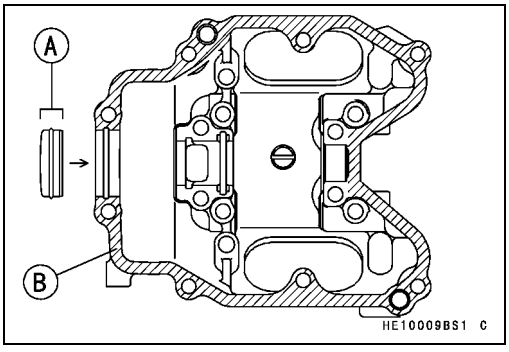
Rocker Case Installation

- Check that the crankshaft is positioned at TDC and at the end of the compression stroke.

NOTICE

Be sure to position the crankshaft is at TDC of the end of the compression stroke. The rocker arms could bend the valves.

- Apply liquid gasket to the outer surface of the cap [A] and the cylinder head upper surface [B] as shown in the figure.
  Sealant - Liquid Gasket, TB1216: 92104-1063



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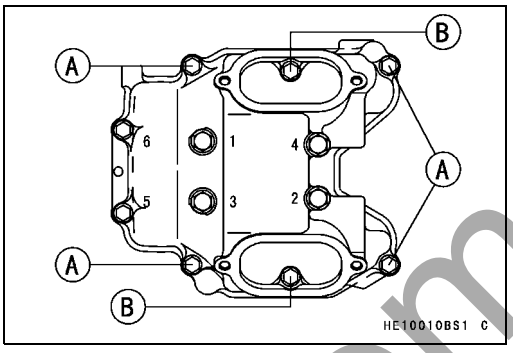
Rocker Case

- Tighten the rocker case bolts following the tightening sequence as shown in the figure.

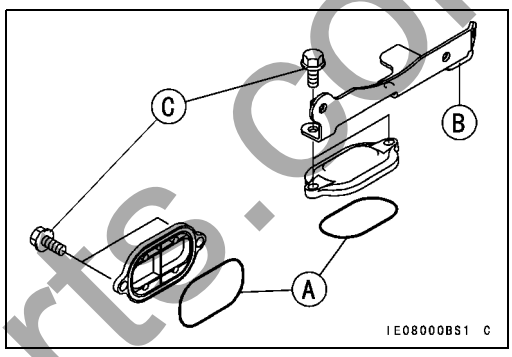
Torque - Rocker Case Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
[1, 2, 3, 4] L = 55 mm (2.2 in.) with washers
Rocker Case Bolts: 9.8 N·m (1.0 kgf·m, 87 in·lb)
[5, 6] L = 130 mm (5.1 in.)
[A] L = 30 mm (1.2 in.)
[B] L = 25 mm (1.0 in.)



- Check the valve clearance and adjust it if necessary.

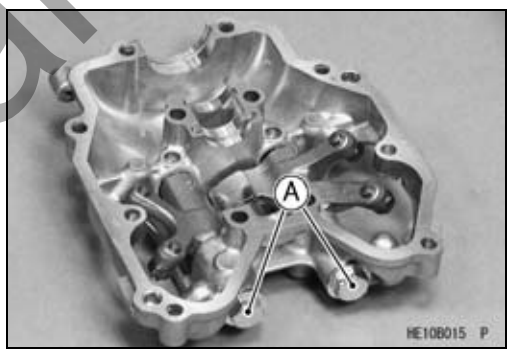
- Apply grease to the O-rings [A].
- Install:
  Bracket [B]
- Tighten:

Torque - Valve Adjusting Cap Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



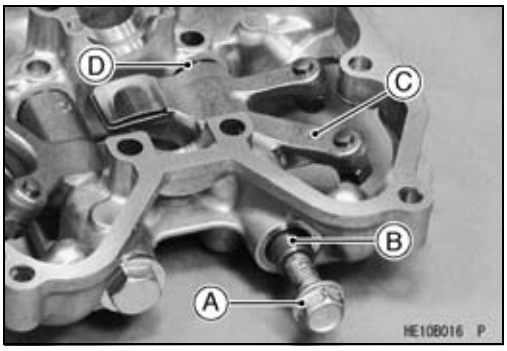
Rocker Arm Removal

- Remove:
  Rocker Case (see Rocker Case Removal)
  Rocker Shaft Bolts [A]



- Using a M8 bolt [A], remove the rocker shaft [B].
- Remove:
  Rocker Arm [C]
  Washers [D]

○Mark and record the rocker arm location so it can be installed in the original position.
○The rocker arms come off with the rocker shafts.



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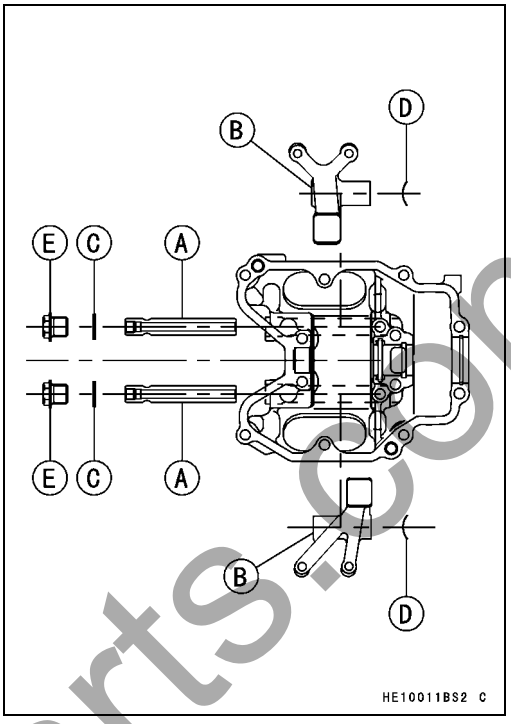
Rocker Case

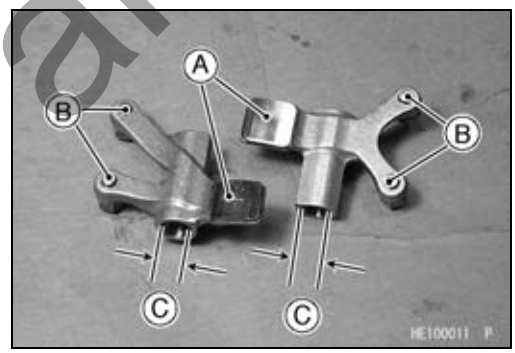
Rocker Arm Installation



- Apply engine oil:
  Rocker Shafts [A]
  Hole in Rocker Arms [B]
- Replace the copper washers [C] with new ones.
- Install:
  Wave Washers [D] (as shown)
  Rocker Arms (as shown)
  Rocker Shafts and Copper Washers
- Tighten:

Torque - Rocker Shaft Bolts [E]: 22 N·m (2.2 kgf·m, 16 ft·lb)

Rocker Arm Inspection



- Inspect the area [A] on the rocker arm where the cam rubs.

★If the rocker arm is scored, discolored or otherwise damaged, replace it. Also inspect the camshaft lobes.

- Inspect the end of the valve clearance adjusting screws [B] where it contacts the valve stem.

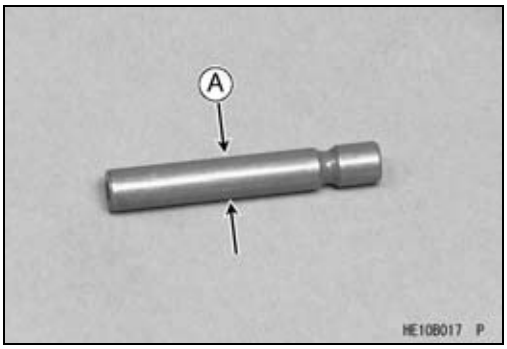
★If the end of the adjusting screw is mushroomed or damaged in any way, or if the screw will not turn smoothly, replace it. Also inspect the end of the valve stem.

- Measure the inside diameter [C] of the rocker arm with a dial bore gauge.

★If the rocker arm inside diameter is larger than the service limit, replace it. Also check the rocker shaft diameter (see Rocker Shaft Diameter Measurement).

Rocker Arm Inside Diameter
Standard: 12.000 ~ 12.018 mm (0.4724 ~ 0.4731 in.)
Service Limit: 12.05 mm (0.474 in.)

Rocker Shaft Diameter Measurement



- Measure the diameter [A] of the rocker shaft where the rocker arm pivots on it with a micrometer.

★If the rocker shaft diameter is smaller than the service limit, replace it. Also check the rocker arm inside diameter (see Rocker Arm Inspection).

Rocker Shaft Diameter
Standard: 11.983 ~ 11.994 mm (0.4718 ~ 0.4722 in.)
Service Limit: 11.96 mm (0.471 in.)

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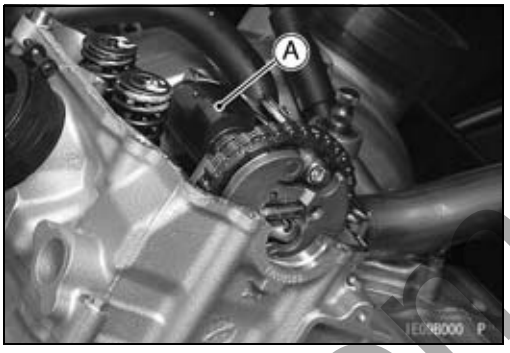
Camshaft

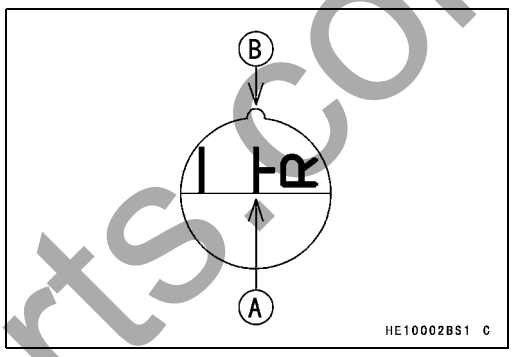
Camshaft Removal

- Remove:
  Camshaft Chain Tensioners (see Camshaft Chain Tensioner Removal)
  Rocker Cases (see Rocker Case Removal)
  Camshafts [A]
- Support the chain using a suitable tool.

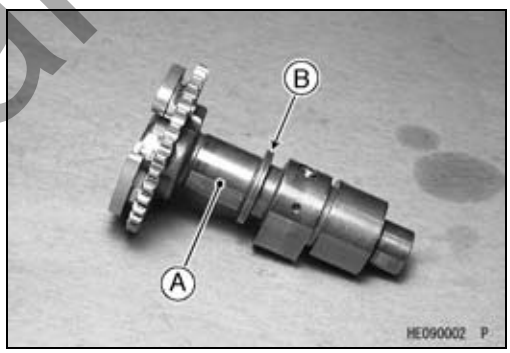


Camshaft Installation

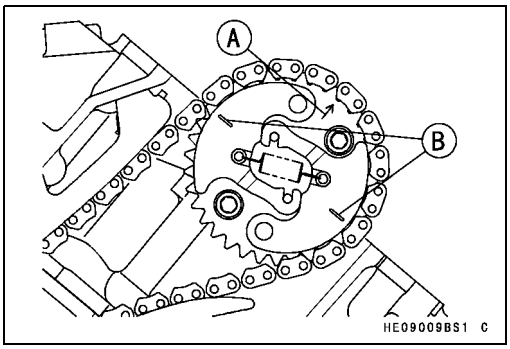
- Using a wrench on the alternator bolt, turn the crankshaft **clockwise** until "T-R" mark [A] is aligned with the notch [B] in the inspection window.



- The rear camshaft [A] has a groove [B].
- First, install the rear camshaft.

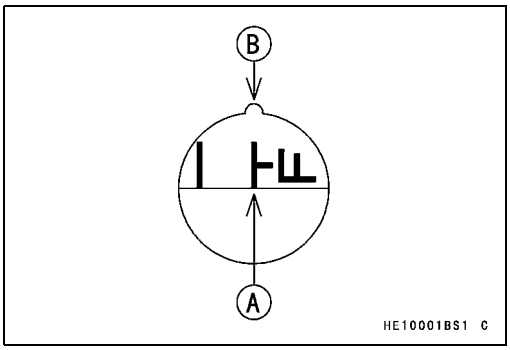


- Face the arrow [A] of the rear camshaft sprocket upward (left side view).
- Engage the rear camshaft chain with the rear camshaft sprocket.
- Align the marks [B] on the weights with the rear cylinder head upper surface.



- Using a wrench on the alternator bolt, turn the crankshaft **clockwise** 270°.

○Align the "T-F" mark [A] with the notch [B] in the inspection window.



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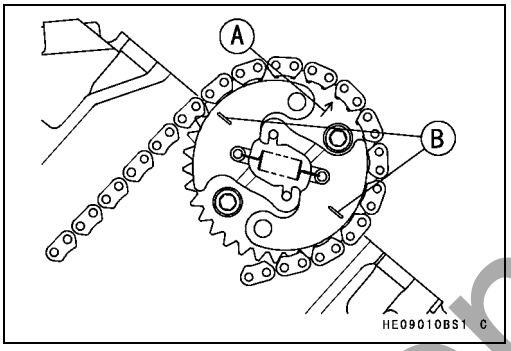
Camshaft

- Face the arrow [A] of the front camshaft sprocket upward (right side view).
- Engage the front camshaft chain with the front camshaft sprocket.
- Align the marks [B] on the weights with the front cylinder head upper surface.

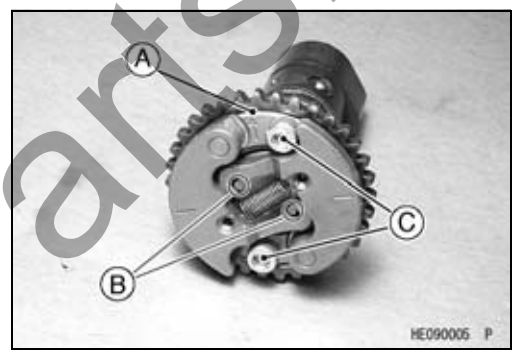


- Install:
  Rocker Cases (see Rocker Case Installation)
  Camshaft Chain Tensioners (see Camshaft Chain Tensioner Installation)
- Check the valve clearance (see Valve Clearance Inspection).

Camshaft Assembly

- Install the KACR unit [A] (sprocket) on the camshaft so that the unit fits onto the camshaft pins [B].
- Apply a non-permanent locking agent to the camshaft sprocket bolts [C].
- Tighten:

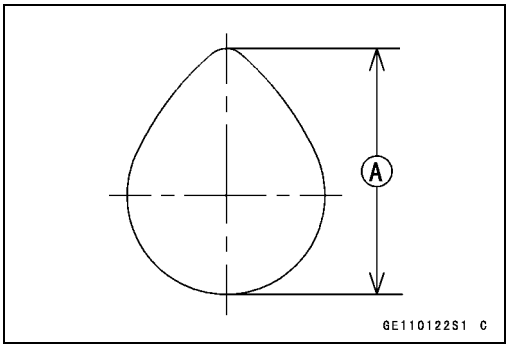
Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



Cam Wear Inspection

- Remove the camshaft.
- Measure the height [A] of the cam with a micrometer.

★If the cams are worn past the service limit, replace the camshaft.



Cam Height
Standard:

Exhaust	**35.363 ~ 35.477 mm (1.3922 ~ 1.3967 in.)**
Inlet	**35.622 ~ 35.736 mm (1.4024 ~ 1.4069 in.)**

Service Limit:

Exhaust	**35.26 mm (1.388 in.)**
Inlet	**35.52 mm (1.398 in.)**

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Camshaft

Camshaft Bearing Wear Inspection

○The journal wear is measured using plastigage (press gauge), which is inserted into the clearance to be measured. The plastigage indicates the clearance by the amount it is compressed and widened when the parts are assembled.

- Cut strips of plastigage to journal width. Place a strip on each journal parallel to the camshaft with the camshaft installed in the correct position so that the plastigage will be compressed between the journal and rocker case.
- Install the rocker case, tightening the bolts in the correct sequence to the specified torque (see Rocker Case Installation).

NOTE

○*Do not turn the camshaft when the plastigage is between the journal and rocker case.*

- Remove the rocker case and measure the plastigage width [A] to determine the clearance between the journal and the rocker case. Measure the widest portion of the plastigage.

Camshaft Bearing Clearance (φ18)
Standard: 0.016 ~ 0.052 mm (0.0006 ~ 0.0020 in.)
Service Limit: 0.14 mm (0.0055 in.)

Camshaft Bearing Clearance (φ22)
Standard: 0.020 ~ 0.059 mm (0.0008 ~ 0.0023 in.)
Service Limit: 0.15 mm (0.0059 in.)

★If any clearance exceeds the service limit, measure the diameter of the camshaft journal.

Camshaft Journal Diameter (φ18)
Standard: 17.966 ~ 17.984 mm (0.7073 ~ 0.7080 in.)
Service Limit: 17.94 mm (0.706 in.)

Camshaft Journal Diameter (φ22)
Standard: 21.959 ~ 21.980 mm (0.8645 ~ 0.8654 in.)
Service Limit: 21.93 mm (0.863 in.)

★If the camshaft journal diameter is less than the service limit, replace the camshaft with a new one and measure the clearance again.
★If the clearance still remains out of the limit, replace the cylinder head and the rocker case.

NOTICE

The cylinder head and rocker case are machined as a set, and must be replaced as a set.

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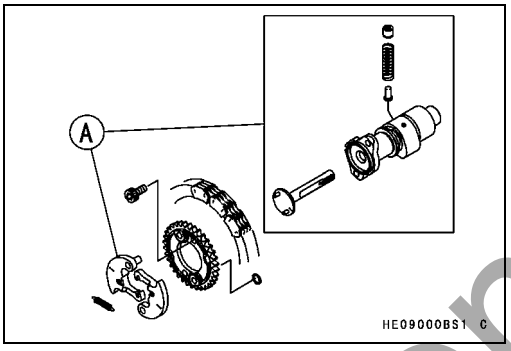
Camshaft

KACR Inspection

The Kawasaki Automatic Compression Release (KACR) momentarily opens the exhaust valves on the compression stroke at very low speeds. This allows some of the compression pressure to escape, making it easy to turn over the engine during starting.

Due to the simplicity of the mechanism, no periodic maintenance is needed. There are only two symptoms of problems with the KACR mechanism [A]: compression is not released during starting, and compression is released during running.



(1) If compression is not released during starting, the weights are not returning to their rest position.

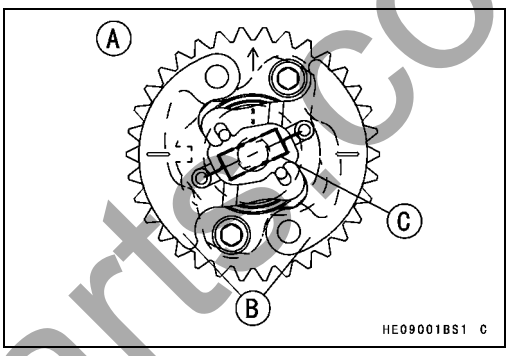
- Remove the camshaft (see Camshaft Removal).
- Remove the KACR unit.
- Visually inspect the spring.

★If damaged, deformed, or missing, replace the spring.

- Remove the spring and move the weights back and forth.

★If the weights do not move smoothly, replace the KACR unit. Also inspect the exhaust rocker arm for any damage, and replace the rocker arm if necessary.

[A] Rest Position (compression is released)
[B] Weights
[C] Spring

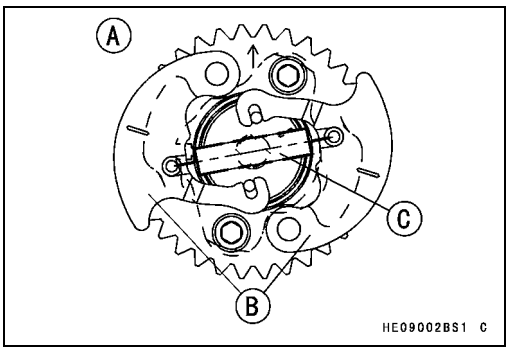


(2) If compression is released while the engine is running, the weights are not swinging out.

- Remove the spring and move the weights back and forth.

★If the weights do not move easily from the retracted position, replace the KACR unit. Also inspect the exhaust rocker arm for any damage, and replace the rocker arm if necessary.

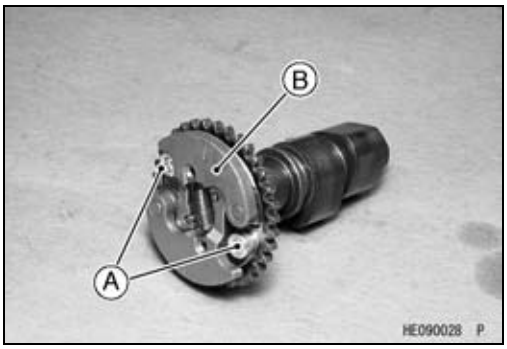
[A] Running Position (compression is not released)
[B] Weights
[C] Spring



KACR Removal

- Remove:

Camshaft (see Camshaft Removal)
Camshaft Sprocket Bolts [A]
KACR Unit [B]



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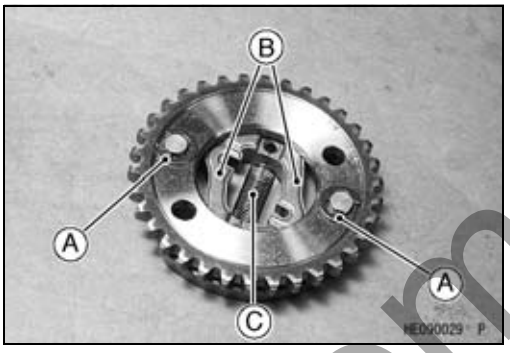
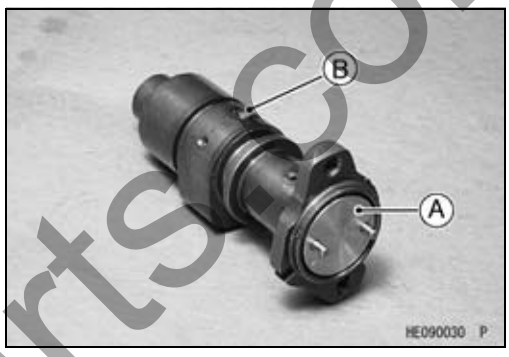
Camshaft

● Remove:
Circlips [A]
Weights [B]
Spring [C]



NOTE

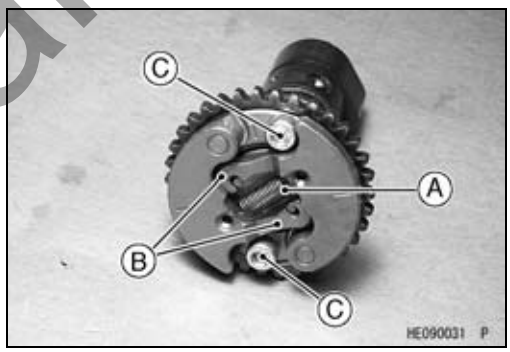
○*Do not remove the shaft [A] and pin [B].*
○*If the parts are removed, they cannot be reinstalled.*



KACR Installation

● Install:
Weights
Circlips
Spring [A]
○Hook the spring from the outside with the open side of the hook inwards.
● Install:
KACR Unit
● Hook the arms [B] on the pins.
● Apply a non-permanent locking agent to the camshaft sprocket bolts [C] and tighten them.

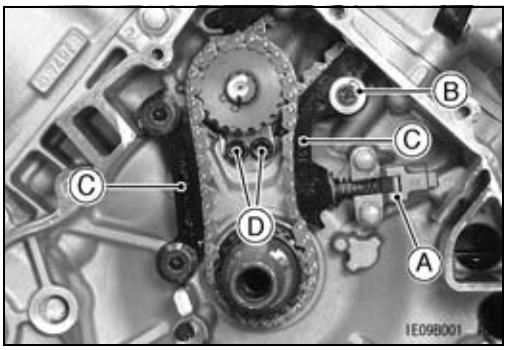
Torque - Camshaft Sprocket Bolts: 12 N·m (1.2 kgf·m, 106 in·lb)



Camshaft Chain Removal

● Remove (left side view):
Rear and Front Camshafts (see Camshaft Removal)
Alternator Rotor (see Alternator Rotor Removal in the Electrical System chapter)
Oil Pump (see Oil Pump Removal in the Engine Lubrication System chapter)
Intermediate Shaft Chain Tensioner [A]
Circlip [B] and Washer

Special Tool - Outside Circlip Pliers: 57001-144



● Remove:
Intermediate Shaft Chain Guides [C]
Position Plate Bolts [D] and Position Plate

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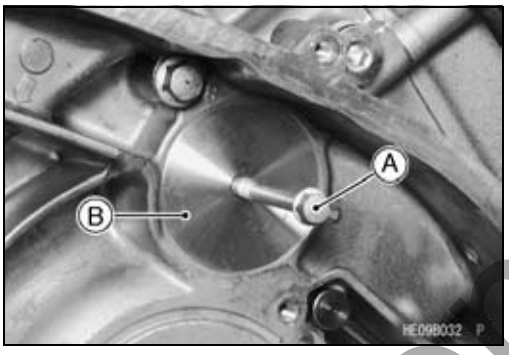
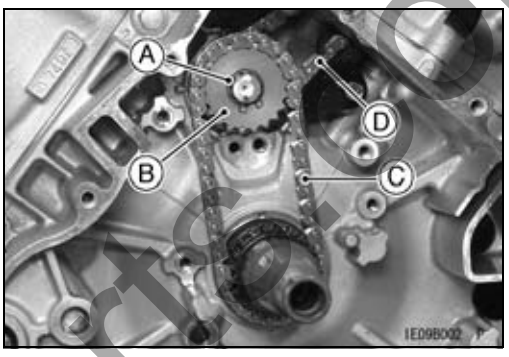
Camshaft

- Remove (right side view):
  Torque Converter Cover (see Torque Converter Cover Removal in the Converter System chapter)
- Using a M6 bolt [A], pull out the cover [B].



- Remove (left side view):
  Circlip [A]

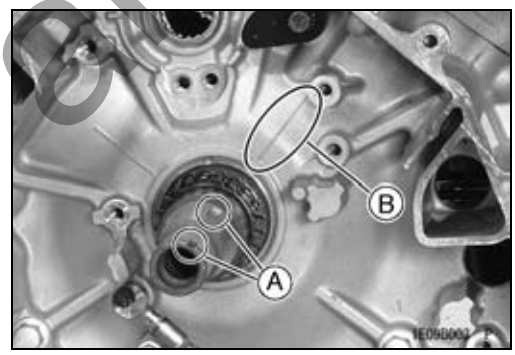
  Special Tool - Outside Circlip Pliers: 57001-144
- Remove:
  Intermediate Shaft Sprocket [B]
  Intermediate Shaft Drive Chain [C]
  Rear Camshaft Chain [D]
  Front Camshaft Chain (right side)



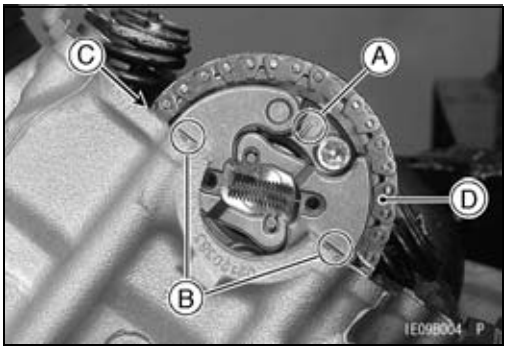
Camshaft Chain Installation

Rear Camshaft Chain

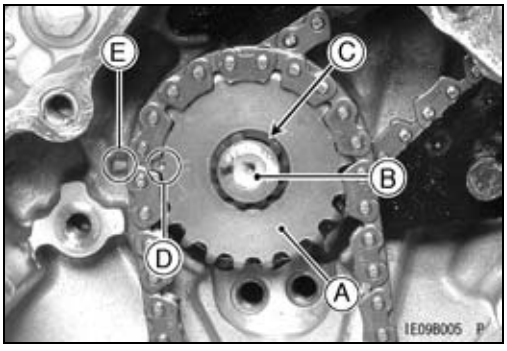
- Align the key grooves [A] on the crankshaft with the embossed line [B] on the crankcase (left side view).



- Face the arrow [A] of the rear camshaft sprocket upward.
- Align the marks [B] on the weights with the rear cylinder head upper surface [C].
- Place the rear camshaft chain [D] onto the rear camshaft sprocket.



- Engage the camshaft and intermediate shaft chains on the intermediate shaft sprocket [A] and insert the intermediate shaft (left side view).
  ○Fit the splines of the intermediate shaft [B] and grooves [C] of the sprocket as shown.
- Align the punch mark [D] on the sprocket with the embossed mark [E] on the crankcase.



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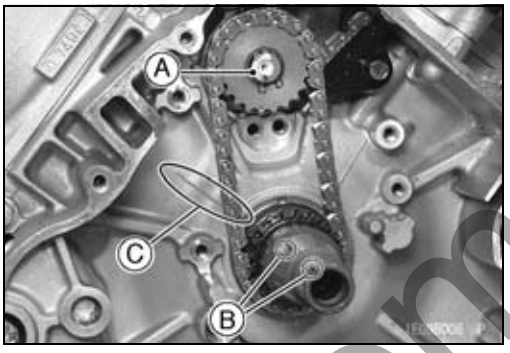
Camshaft

Front Camshaft Chain

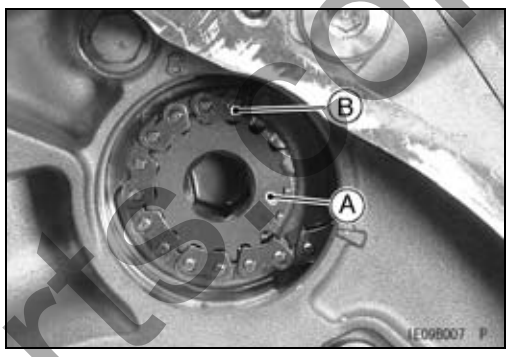
- Install the circlip [A].

  Special Tool - Outside Circlip Pliers: 57001-144

- Rotate the crankshaft **clockwise** 270°.
- Align the key grooves [B] on the crankshaft with the embossed line [C] on the crankcase.

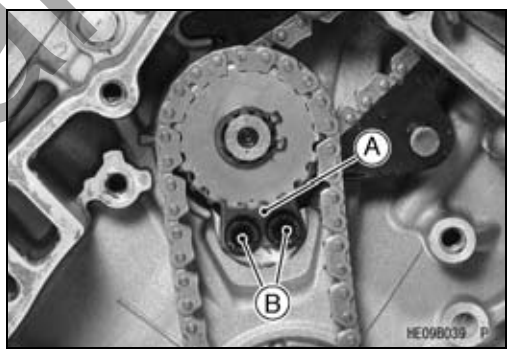


- Move the intermediate shaft [A] to the left side of the engine.
- Engage the front camshaft chain [B] with the sprocket on the intermediate shaft.



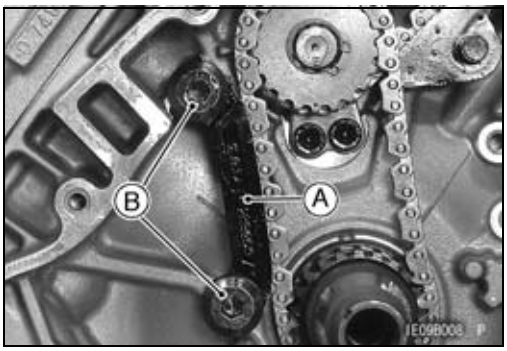
- Install (left side view):
  Position Plate [A]
- Tighten:

  Torque - Position Plate Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



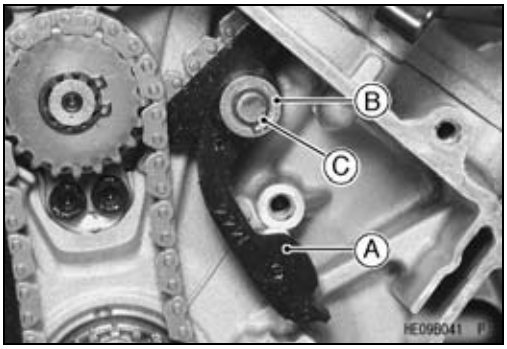
- Install:
  Intermediate Shaft Chain Guide [A] (front)
- Tighten:

  Torque - Intermediate Shaft Chain Guide Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



- Install:
  Intermediate Shaft Chain Guide [A] (Rear)
  Washer [B]
  Circlip [C]

  Special Tool - Outside Circlip Pliers: 57001-144



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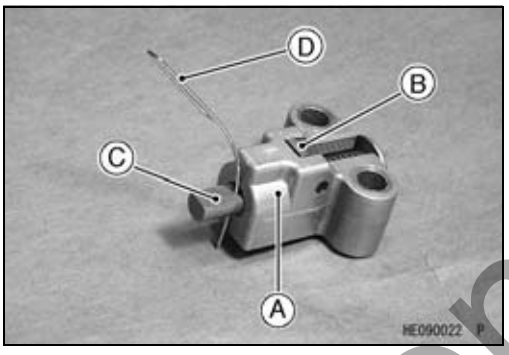
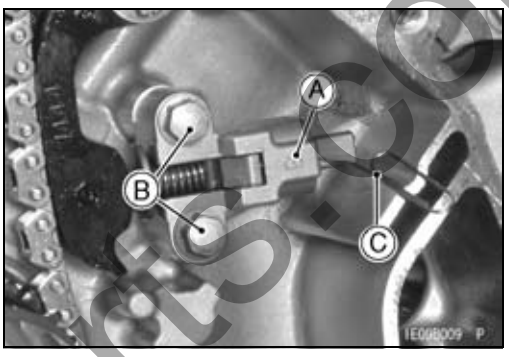
Camshaft

- Install the intermediate shaft chain tensioner [A] as follows:
- Release the stopper [B] and push the push rod [C] into the tensioner body.
- Insert a wire [D] into the rod hole to hold the rod in place.

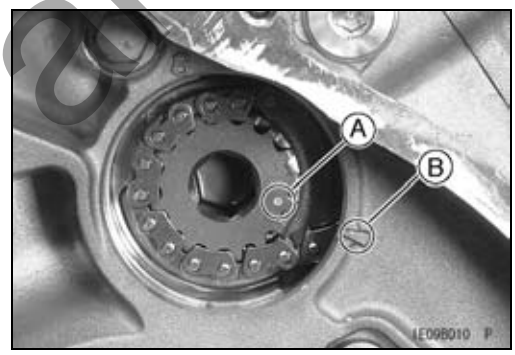


- Install:
  Intermediate Shaft Chain Tensioner [A]
- Tighten:

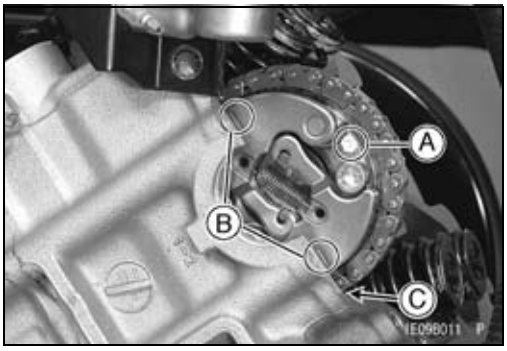
  Torque - Intermediate Shaft Chain Tensioner Bolts [B]: 8.8 N·m (0.90 kgf·m, 78 in·lb)
- Remove the wire [C] to free the push rod.



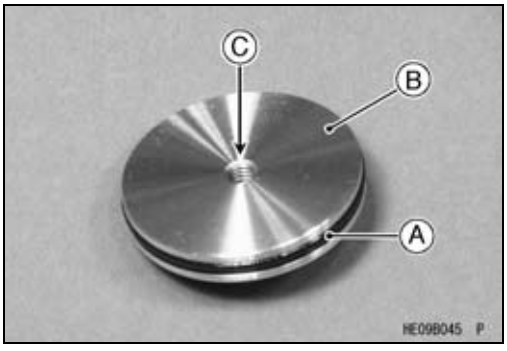
- Confirm that the punch mark [A] on the intermediate shaft sprocket (Right Side) is aligned with the embossed mark [B] on the crankcase.



- Face the arrow mark [A] upward.
- Align the marks [B] on the weights with the front cylinder head upper surface [C].
- Place the front camshaft chain on the front camshaft sprocket.



- Apply grease to the O-ring [A] and install the cover [B] into the right side of the crankcase so that the tapped hole [C] faces outward.



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Camshaft

- Install:
  Rocker Cases (see Rocker Case Installation)
  Camshaft Chain Tensioners (see Camshaft Chain Tensioner Installation)
- Check the valve clearances (see Valve Clearance Inspection).

Camshaft Chain Guide Wear Inspection

- Visually inspect the rubber on the guides.

★If the rubber is damaged, cut, or is missing pieces, replace the guide.

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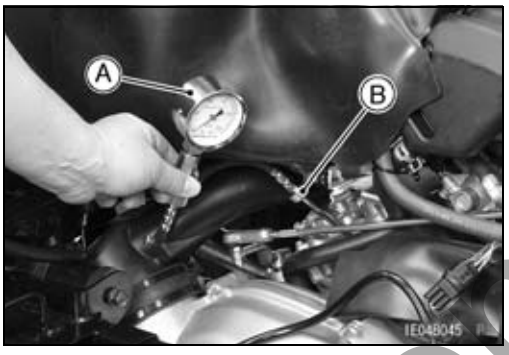
Cylinder Head

Cylinder Compression Measurement



NOTE

○*Use the battery which is fully charged.*

- Warm up the engine thoroughly, and stop the engine.
- Remove the spark plug (see Spark Plug Removal in the Electrical System chapter).
- Attach the compression gauge [A] and adapter [B] firmly into the spark plug hole.

Special Tools - Compression Gauge, 20 kgf/cm²: 57001-221
Compression Gauge Adapter, M10 × 1.0: 57001-1317

- Hold the throttle wide open and crank the engine with the electric starter or the recoil starter several times.

○When the gauge stops rising, stop cranking and read the gauge.

Cylinder Compression (Usable Range)
Electric Starter: 251 ~ 456 kPa (2.56 ~ 4.65 kgf/cm², 36 ~ 66 psi) @380 r/min (rpm)

The following table should be consulted if the obtainable compression reading is not within the usable range.

Problem	Diagnosis	Remedy (Action)
Cylinder compression is higher than usable range.	Carbon accumulation on piston, cylinder head, and in combustion chamber possibly due to damaged valve stem oil seal and/or damaged piston oil rings (This may be indicated by white exhaust smoke).	Remove the carbon deposits and replace damaged parts if necessary.
	Incorrect cylinder head gasket thickness	Replace the gasket with a standard part.
	Damaged or missing compression release cam spring	Replace the spring.
	Compression release weights do not move smoothly.	Replace the compression release unit.
Cylinder compression is lower than usable range.	Gas leakage around cylinder head	Replace damaged gasket and check cylinder head warp.
	Bad condition of valve seating	Repair if necessary.
	Incorrect valve clearance	Adjust the valve clearance.
	Incorrect piston/cylinder clearance	Replace the piston and/or cylinder.
	Piston seizure	Inspect the cylinder and liner and replace/repair the cylinder and/or piston as necessary.
	Bad condition of piston ring and/or piston ring grooves	Replace the piston and/or the piston rings.
	Compression release weights do not move smoothly.	Replace the compression release unit.

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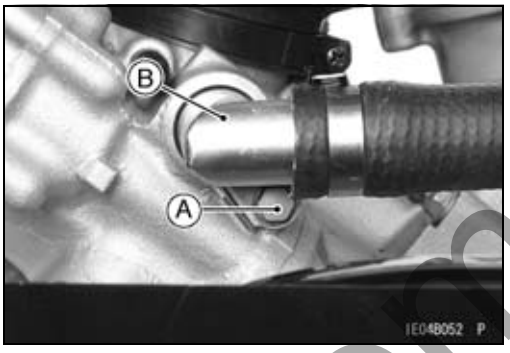
Cylinder Head

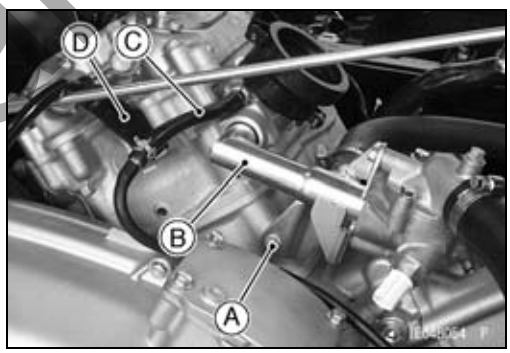
Cylinder Head Removal

- Drain the coolant (see Coolant Change in the Periodic Maintenance chapter).
- Remove:
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System chapter)
  Exhaust Pipe (see Muffler and Exhaust Pipe Removal)
  Spark Plug Cap
  Water Pipe Bolt [A]
  Front Water Pipe [B]



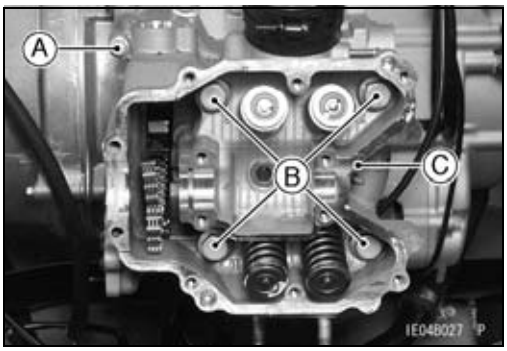
- Remove:
  Water Pipe Bolt [A] (for Rear Water Pipe)

- Remove:
  Bolt [A]
  Rear Water Pipe [B]
  Vacuum Hoses [C]
  Spark Plug Cap [D]
  Rocker Case (see Rocker Case Removal)
  Camshaft (see Camshaft Removal)



- Remove:
  Cylinder Head Bolt (M6) [A]
  Cylinder Head Bolts (M10) [B] and Washers
  Cylinder Head [C] and Gasket

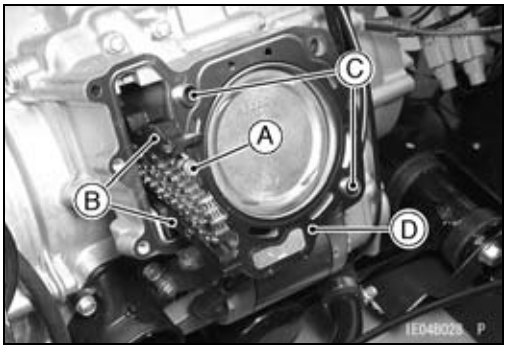
○Lift the cylinder head to clear the dowel pins in the cylinder.



Cylinder Head Installation

- Apply grease to the O-rings on the oil pipe [A], and insert the pipe.
- Install:
  Camshaft Chain Guides [B]
  Dowel Pins [C]
  New Cylinder Head Gasket [D]
- Tighten:

Torque - Front Cylinder Camshaft Chain Guide Bolt: 20 N·m (2.0 kgf·m, 15 ft·lb)



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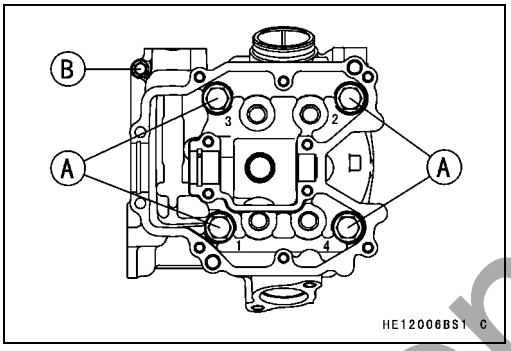
Cylinder Head

- Apply molybdenum disulfide oil to the threads and seating surface of the cylinder head bolts (M10) and both sides of the washers.
- Tighten the cylinder head bolts [A] following the tightening sequence as shown.

First Torque - Cylinder Head Bolts (M10): 25 N·m (2.5 kgf·m, 18 ft·lb)

Final Torque - Cylinder Head Bolts (M10): 49 N·m (5.0 kgf·m, 36 ft·lb)



- Tighten the cylinder head bolt (M6) [B].

Torque - Cylinder Head Bolt (M6): 9.8 N·m (1.0 kgf·m, 87 in·lb)

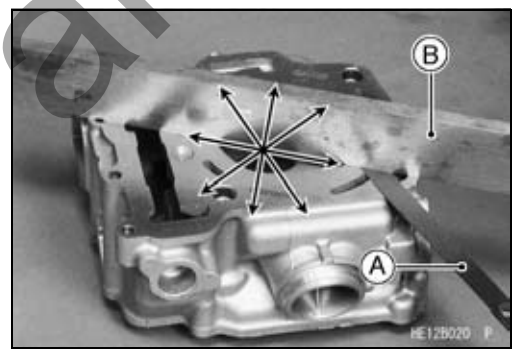
Cylinder Head Cleaning

- Remove the cylinder head (see Cylinder Head Removal).
- Scrape the carbon out of the combustion chamber and exhaust port with a suitable tool.
- Wash the head with a high-flash point solvent.
- Blow out any particles which may obstruct the oil passage in the cylinder head using compressed air.

Cylinder Head Warp Inspection

- Clean the cylinder head (see Cylinder Head Cleaning).
- Lay a straightedge across the lower surface of the cylinder head.
- Use a thickness gauge [A] to measure the space between the straightedge [B] and the head at several locations.

Cylinder Head Warp
Service Limit: 0.05 mm (0.002 in.)



★If the cylinder head is warped more than the service limit, replace it.

★If the cylinder head is warped less than the service limit, repair the head by lapping the lower surface with emery paper secured to a surface plate (first No. 200, then No. 400).

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Valves

Valve Clearance Inspection

● Refer to the Valve Clearance Inspection in the Periodic Maintenance chapter.

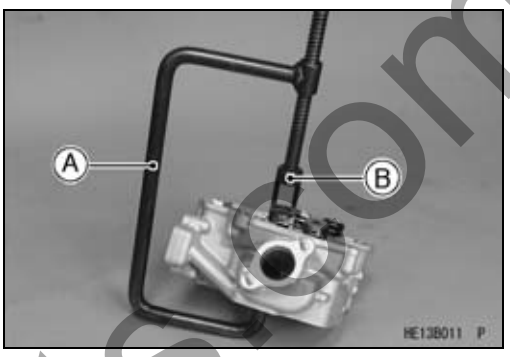
Valve Clearance Adjustment

● Refer to the Valve Clearance Adjustment in the Periodic Maintenance chapter.

Valve Removal

● Remove the cylinder head (see Cylinder Head Removal).
○Mark and record the valve location so it can be installed in the original position.
● Using the valve spring compressor assembly, remove the valve.

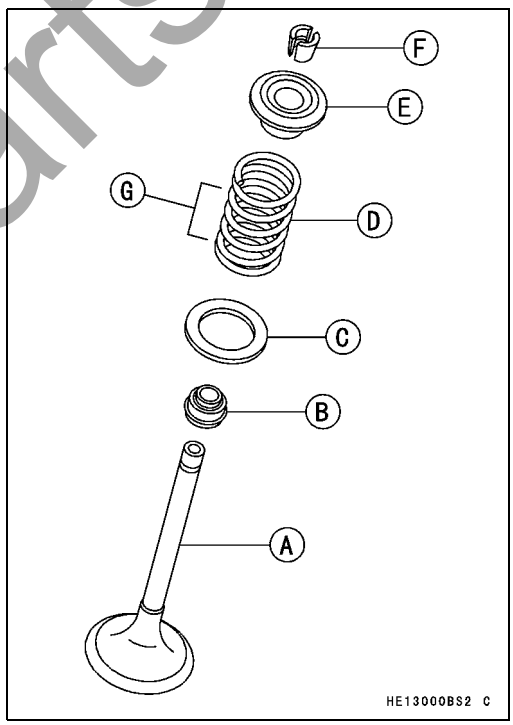
Special Tools - Valve Spring Compressor Assembly [A]: 57001-241
Valve Spring Compressor Adapter, ϕ22 [B]: 57001-1202



Valve Installation

● Install the spring seat.
● Replace the valve stem oil seal.
★If a new valve is to be used, check the valve-to-guide clearance (see Valve-to-Guide Clearance Measurement).
★If there is too little clearance, ream the valve guide (see Valve Guide Installation).
★If there is too much clearance, install a new valve guide (see Valve Guide Removal and Valve Guide Installation).
● Check the valve seat (see Valve Seat Inspection).
● Apply a thin coat of molybdenum disulfide grease to the valve stem.
● Install each spring so that the closed coil end faces downwards.
○The white paint on the spring faces upwards.

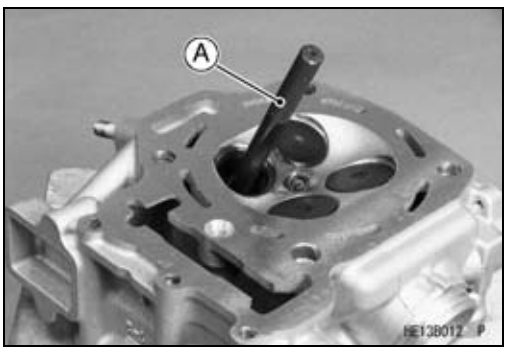
Valve Stem [A]
Oil Seal [B]
Spring Seat [C]
Spring [D]
Retainer [E]
Split Keepers [F]
Closed Coil End [G]



Valve Guide Removal

● Remove:
Valve (see Valve Removal)
Valve Stem Oil Seal
● Hammer lightly on the valve guide arbor [A] to remove the guide from the top of the head.

Special Tool - Valve Guide Arbor, ϕ5: 57001-1203



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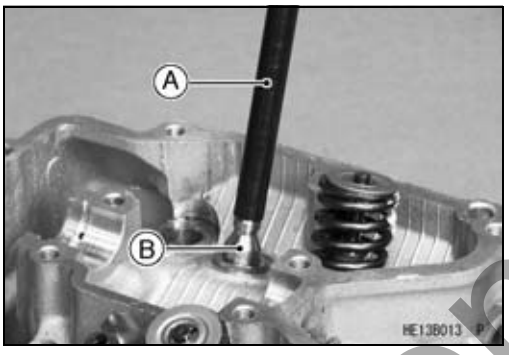
Valves

Valve Guide Installation

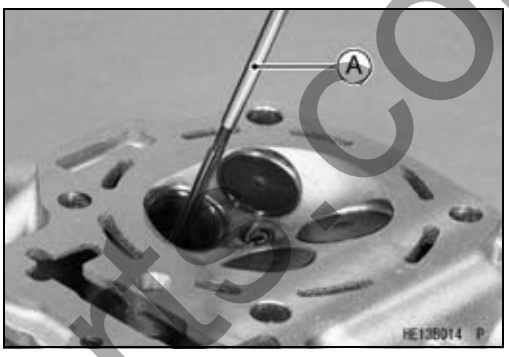
- Lightly oil the valve guide outer surface.
- Using the valve guide arbor [A], drive the valve guide [B] until its flange touches the cylinder head.

Special Tool - Valve Guide Arbor, ϕ5: 57001-1203



- Ream the valve guide with the valve guide reamer [A] , it may be necessary to ream the guide even if the old guide is reused.

Special Tool - Valve Guide Reamer, ϕ5: 57001-1204

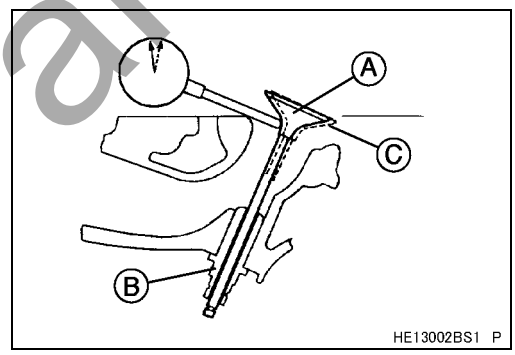


Valve-to-Guide Clearance Measurement

If a small bore gauge is not available, inspect the valve guide wear by measuring the valve to valve guide clearance with the wobble method as indicated below.

- Insert a new valve [A] into the guide [B] and set a dial gauge against the stem perpendicular to it as close as possible to the cylinder head mating surface.
- Move [C] the stem back and forth to measure valve/valve guide clearance.
- Repeat the measurement in a direction at a right angle to the first.

★If the reading exceeds the service limit, replace the guide.



NOTE

○*The reading is not actual valve/valve guide clearance because the measuring point is above the guide.*

Valve/Valve Guide Clearance (Wobble Method)

Standard:

Exhaust	**0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in.)**
Inlet	**0.03 ~ 0.11 mm (0.0012 ~ 0.0043 in.)**

Service Limit:

Exhaust	**0.37 mm (0.0146 in.)**
Inlet	**0.31 mm (0.0122 in.)**

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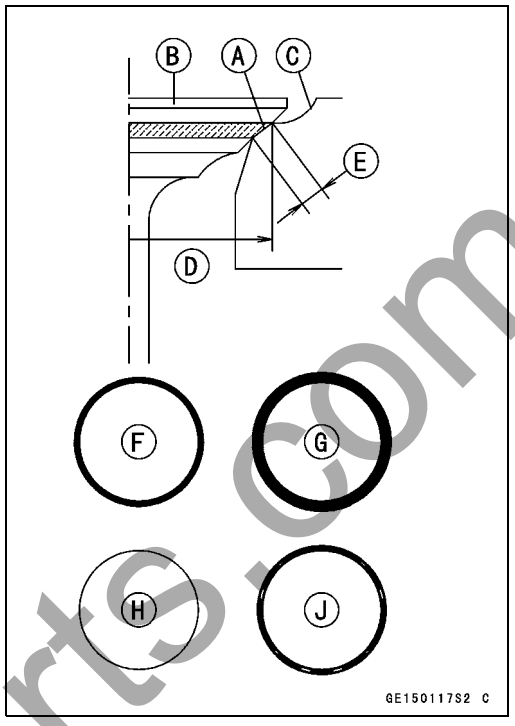
Valves

Valve Seat Inspection



- Remove the valve (see Valve Removal).
- Check the valve seating surface [A] between the valve [B] and valve seat [C].

○Coat the valve seat with machinist's dye.
○Push the valve into the guide.
○Rotate the valve against the seat with a lapping tool.
○Pull the valve out, and check the seating pattern on the valve head. It must be the correct width and even all the way around.

- Measure the outside diameter [D] of the seating pattern on the valve seat.

★If the outside diameter of the valve seating pattern is too large or too small, repair the seat (see Valve Seat Repair).

Valve Seating Surface Outside Diameter
Exhaust: 25.2 ~ 25.4 mm (0.992 ~ 1.000 in.)
Inlet: 29.4 ~ 29.6 mm (1.157 ~ 1.165 in.)

NOTE

○*The valve stem and guide must be in good condition, or this check will not be valid.*

★If the valve seating pattern is not correct, repair the seat (see Valve Seat Repair).

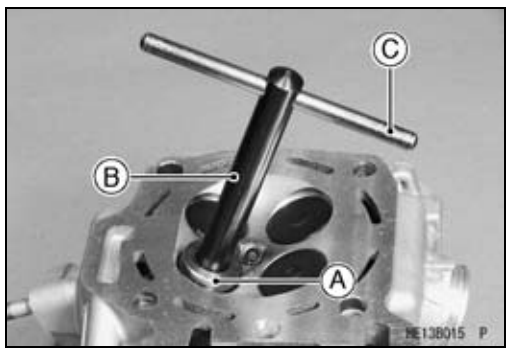
- Measure the seat width [E] of the portion where there is no build-up carbon (white portion) of the valve seat with vernier calipers.

★If the width is too wide, too narrow or uneven, repair the seat (see Valve Seat Repair).

[F] Good
[G] Too Wide
[H] Too Narrow
[J] Uneven

Valve Seating Surface Width
Exhaust: 0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)
Inlet: 0.5 ~ 1.0 mm (0.02 ~ 0.04 in.)

Valve Seat Repair (Valve Lapping)



- Using the valve seat cutters [A], repair the valve seat.

Special Tools - Valve Seat Cutters:
Exhaust Valves:
Valve Seat Cutter, 45° - ϕ27.5: 57001-1114
Valve Seat Cutter, 32° - ϕ28: 57001-1119
Valve Seat Cutter, 60° - ϕ30: 57001-1123
Inlet Valves:
Valve Seat Cutter, 45° - ϕ30: 57001-1187
Valve Seat Cutter, 32° - ϕ33: 57001-1199
Valve Seat Cutter, 60° - ϕ30: 57001-1123
Holder and Bar:
Valve Seat Cutter Holder, ϕ5: 57001-1208 [B]
Valve Seat Cutter Holder Bar: 57001-1128 [C]

★If the manufacturer's instructions are not available, use the following procedure.

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Valves

Seat Cutter Operation Care

1. This valve seat cutter is developed to grind the valve seat for repair. Therefore the cutter must not be used for other purposes than seat repair.
2. Do not drop or shock the valve seat cutter, or the diamond particles may fall off.
3. Do not fail to apply engine oil to the valve seat cutter before grinding the seat surface. Also wash off ground particles sticking to the cutter with washing oil.

NOTE

○*Do not use a wire brush to remove the metal particles from the cutter. It will take off the diamond particles.*

4. Setting the valve seat cutter holder in position, operate the cutter in one hand. Do not apply too much force to the diamond portion.

NOTE

○*Prior to grinding, apply engine oil to the cutter and during the operation, wash off any ground particles sticking to the cutter with washing oil.*

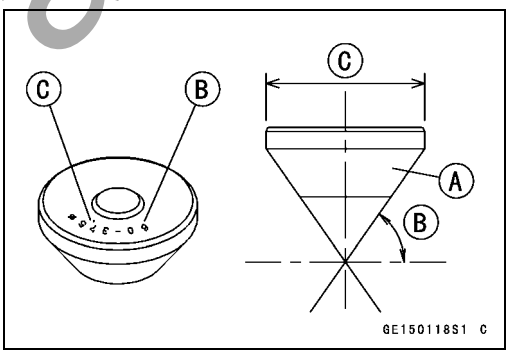
5. After use, wash it with washing oil and apply thin layer of engine oil before storing.

Marks Stamped on the Cutter

The marks stamped on the back of the cutter [A] represent the following.

60° ..... Cutter angle [B]

37.5ϕ ..... Outer diameter of cutter [C]



Operating Procedures

- Clean the seat area carefully.
- Coat the seat with machinist's dye.
- Fit a 45° cutter into the holder and slide it into the valve guide.
- Press down lightly on the handle and turn it right or left. Grind the seating surface only until it is smooth.

NOTICE

Do not grind the seat too much. Overgrinding will reduce valve clearance by sinking the valve into the head. If the valve sinks too far into the head, it will be impossible to adjust the clearance, and the cylinder head must be replaced.

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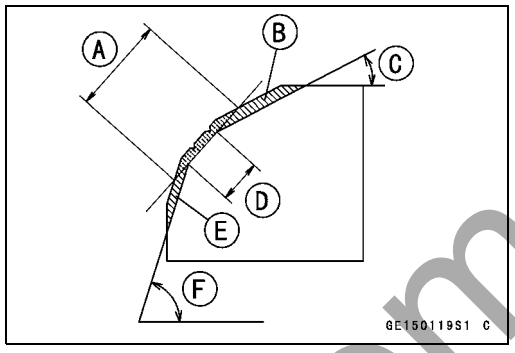
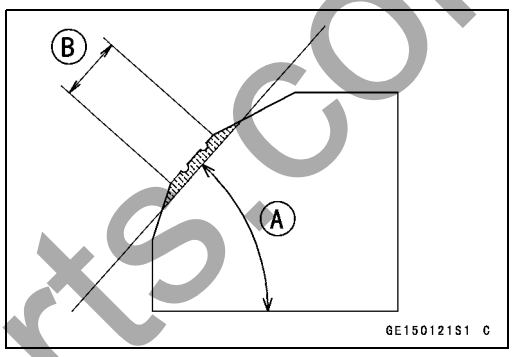
Valves

Widened Width [A] of engagement by machining with 45° cutter
Ground Volume [B] by 32° cutter
32° [C]
Correct Width [D]
Ground Volume [E] by 60° cutter
60° [F]



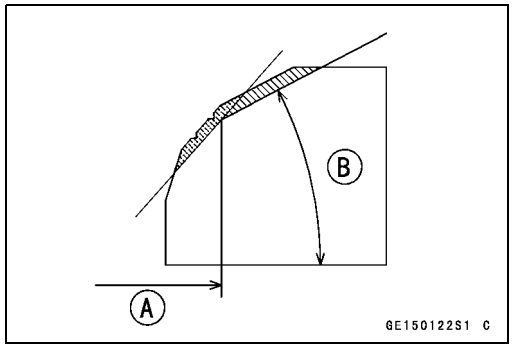
● Measure the outside diameter of the seating surface with vernier calipers.
★If the outside diameter of the seating surface is too small, repeat the 45° grind [A] until the diameter is within the specified range.
Original Seating Surface [B]



NOTE

○*Remove all pittings of flaws from 45° ground surface.*
○*After grinding with 45° cutter, apply thin coat of machinist's dye to seating surface. This makes seating surface distinct and 32° and 60° grinding operation easier.*
○*When the valve guide is replaced, be sure to grind with 45° cutter for centering and good contact.*

★If the outside diameter (O.D.) [A] of the seating surface is too large, make the 32° grind described below.
★If the outside diameter of the seating surface is within the specified range, measure the seat width as described below.
● Grind the seat at a 32° angle [B] until the seat O.D. is within the specified range.
○To make the 32° grind, fit a 32° cutter into the holder, and slide it into the valve guide.
○Turn the holder one turn at a time while pressing down very lightly. Check the seat after each turn.



NOTICE

The 32° cutter removes material very quickly. Check the seat outside diameter frequently to prevent overgrinding.

After making the 32° grind, return to the seat O.D. measurement step above.
● To measure the seat width, use vernier calipers to measure the width of the 45° angle portion of the seat at several places around the seat.
★If the seat width is too narrow, repeat the 45° grind until the seat is slightly too wide, and then return to the seat O.D. measurement step above.

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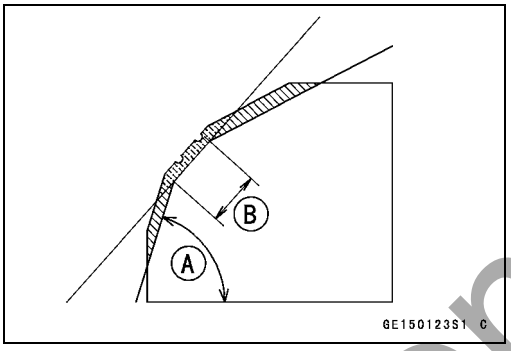
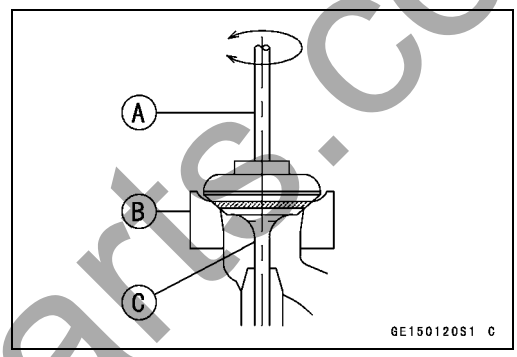
Valves

★If the seat width is too wide, make the 60° [A] grind described below.
★If the seat width is within the specified range, lap the valve to the seat as described below.
● Grind the seat at a 60° angle until the seat width is within the specified range.
○To make the 60° grind, fit 60° cutter into the holder, and slide it into the valve guide.
○Turn the holder, while pressing down lightly.
○After making the 60° grind, return to the seat width measurement step above.
Correct Width [B]



● Lap the valve to the seat, once the seat width and O.D. are within the ranges specified above.
○Put a little coarse grinding compound on the face of the valve in a number of places around the valve head.
○Spin the valve against the seat until the grinding compound produces a smooth, matched surface on both the seat and the valve.
○Repeat the process with a fine grinding compound.
[A] Lapper
[B] Valve Seat
[C] Valve



● The seating area should be marked about in the middle of the valve face.
★If the seat area is not in the right place on the valve, check to be sure the valve is the correct part. If it is, it may have been refaced too much; replace it.
● Be sure to remove all grinding compound before assembly.
● When the engine is assembled, be sure to adjust the valve clearance (see Valve Clearance Adjustment in the Periodic Maintenance chapter).

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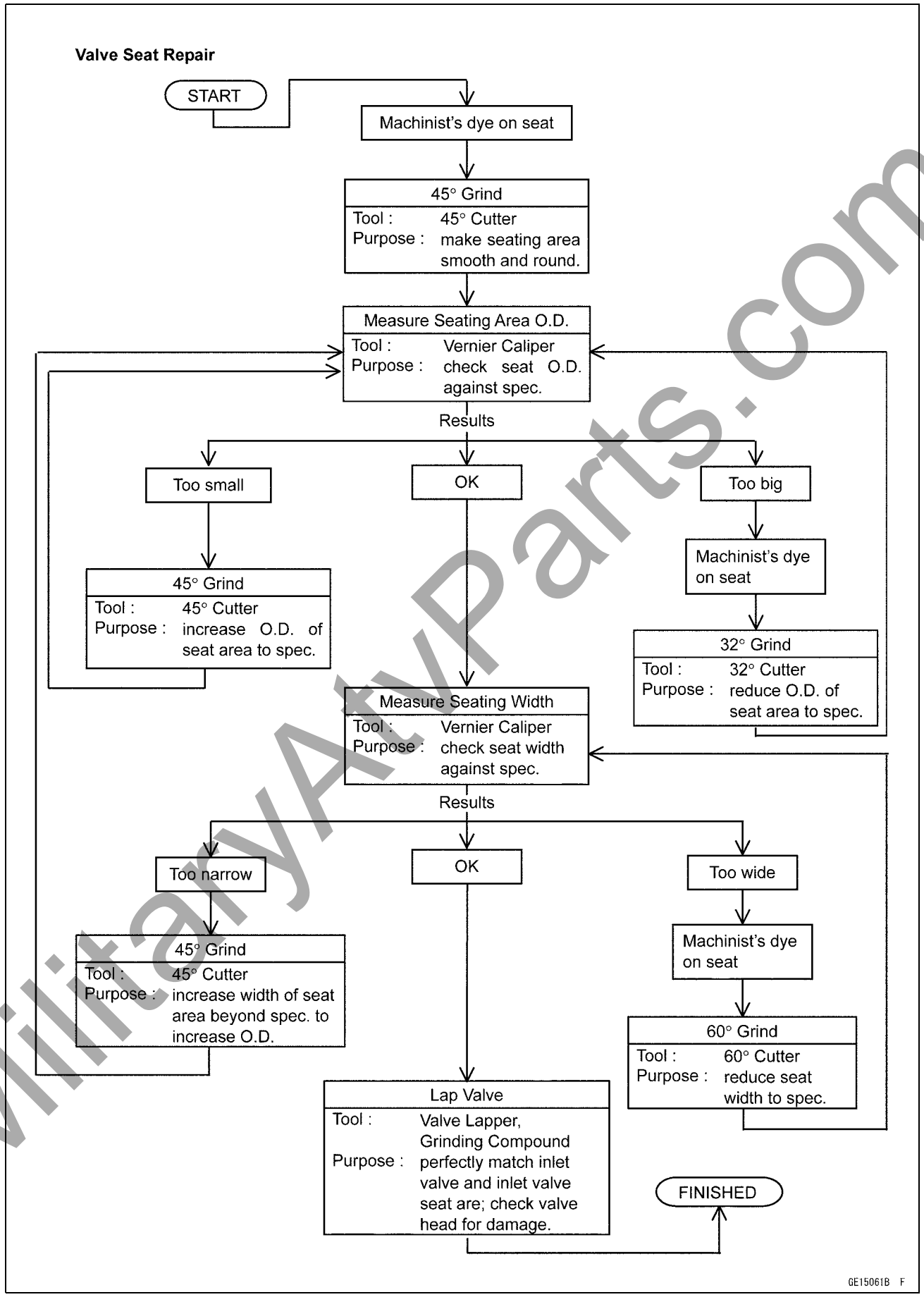
Valves


Valve Seat Repair
START
Machinist's dye on seat
45° Grind
Tool : 45° Cutter
Purpose : make seating area smooth and round.
Measure Seating Area O.D.
Tool : Vernier Caliper
Purpose : check seat O.D. against spec.
Results
Too small
OK
Too big
45° Grind
Tool : 45° Cutter
Purpose : increase O.D. of seat area to spec.
Machinist's dye on seat
32° Grind
Tool : 32° Cutter
Purpose : reduce O.D. of seat area to spec.
Measure Seating Width
Tool : Vernier Caliper
Purpose : check seat width against spec.
Results
Too narrow
OK
Too wide
45° Grind
Tool : 45° Cutter
Purpose : increase width of seat area beyond spec. to increase O.D.
Machinist's dye on seat
60° Grind
Tool : 60° Cutter
Purpose : reduce seat width to spec.
Lap Valve
Tool : Valve Lapper, Grinding Compound
Purpose : perfectly match inlet valve and inlet valve seat are; check valve head for damage.
FINISHED
GE15061B F

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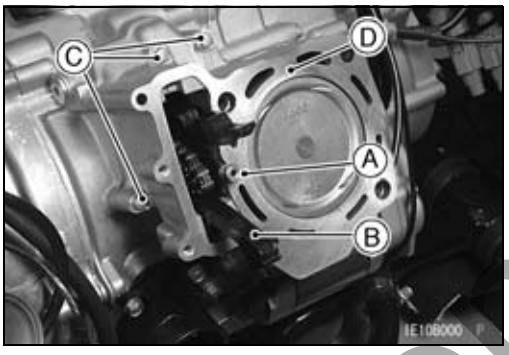
Cylinder and Piston

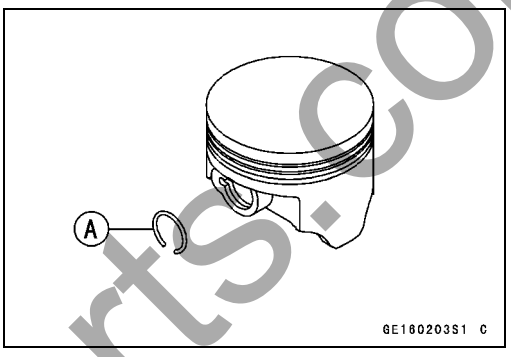
Cylinder Removal



- Remove:
  Cylinder Head (see Cylinder Head Removal)
  Oil Pipe [A]
  Chain Guide [B]
  Cylinder Bolts [C]
  Cylinder [D]
  Cylinder Base Gasket

Piston Removal

- Remove the cylinder block (see Cylinder Removal).
- Place a piece of clean cloth under the piston and remove the piston pin snap rings [A] from the outside of each piston.

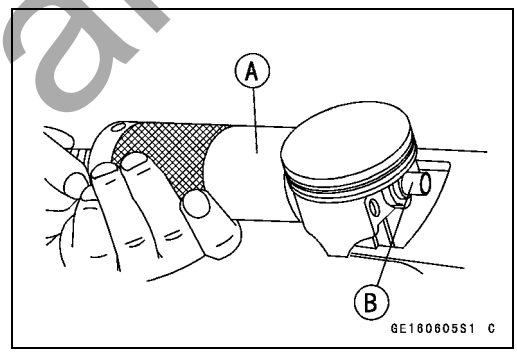


NOTICE

Do not reuse snap rings, as removal weakens and deforms them. They could fall out and score the cylinder wall.

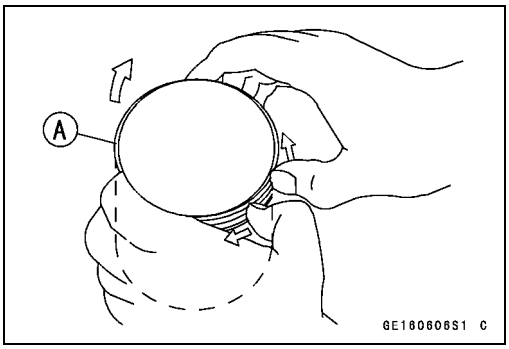
- Using the piston pin puller assembly (special tool), remove the piston pins.

  Special Tools - Piston Pin Puller Assembly [A]: 57001-910
  Piston Pin Puller Adapter, ϕ14 [B]: 57001 -1211



- Remove the piston.

- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring [A] to remove it.
- Remove the 3-piece oil ring with your thumbs in the same manner.



Cylinder, Piston Installation

NOTE

○*If a new piston or cylinder is used, check piston to cylinder clearance (see Piston/Cylinder Clearance), and use new piston rings.*

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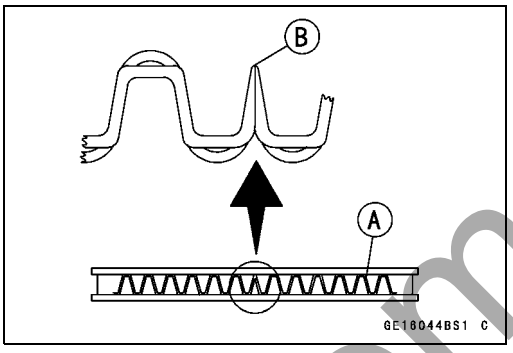
Cylinder and Piston

NOTE

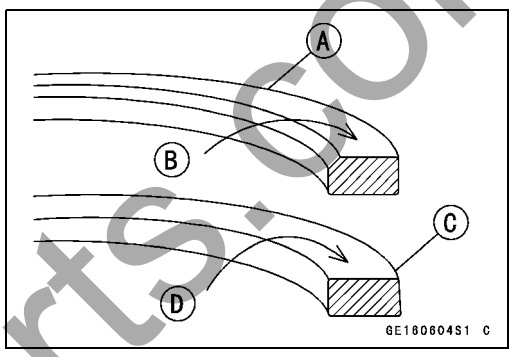
○*The oil ring rails have no "top" or "bottom".*



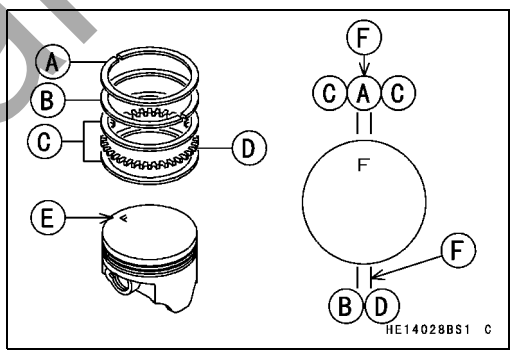
- Install the oil ring expander [A] in the bottom piston ring groove so the ends [B] butt together.
- Install the oil ring steel rails, one above the expander and one below it.

○Spread the rail with your thumbs, but only enough to fit the rail over the piston.

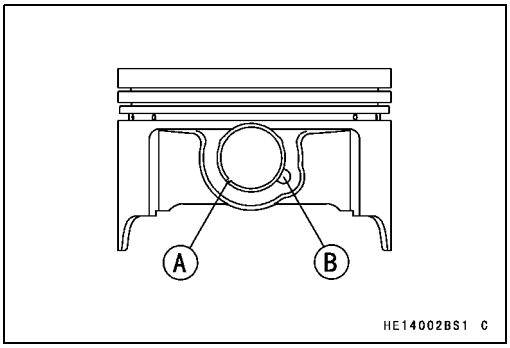
○Release the rail into the bottom piston ring groove.



- Do not mix up the top ring and second ring.
- Install the top ring [A] so that the "**R**" mark [B] faces up.
- Install the second ring [C] so that the "**RN**" mark [D] faces up.



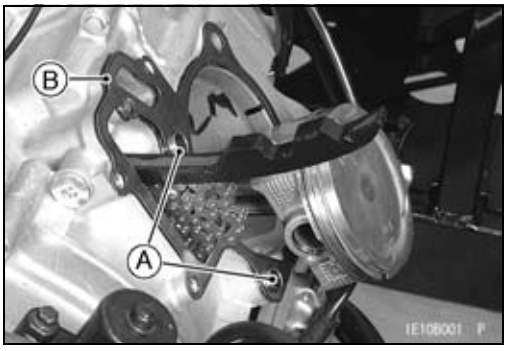
- The piston ring openings must be positioned as shown in the figure. The openings of the oil ring steel rails do not align.
  Top Ring [A]
  Second Ring [B]
  Oil Ring Steel Rails [C]
  Oil Ring Expander [D]
  F mark [E] must be faced toward Front Side for front and rear pistons
  Opening Positions [F]



- Fit a new piston pin snap ring into the side of the piston so that the ring opening [A] does not coincide with the slit [B] of the piston pin hole.

○When installing the piston pin snap ring, compress it only enough to install it and no more.

- Apply engine oil to the cylinder bore and, piston skirt.



- Install:
  Dowel Pins [A]
  New Cylinder Base Gasket [B]

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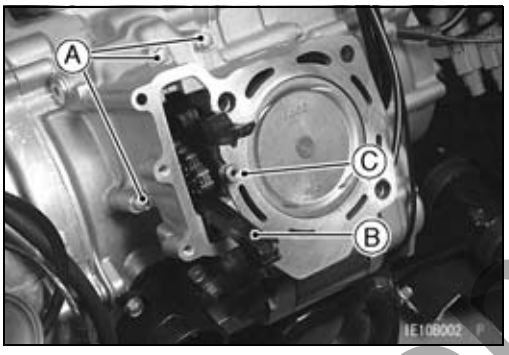
Cylinder and Piston

- Install:
  Cylinder
- Tighten:

Torque - Cylinder Bolts [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

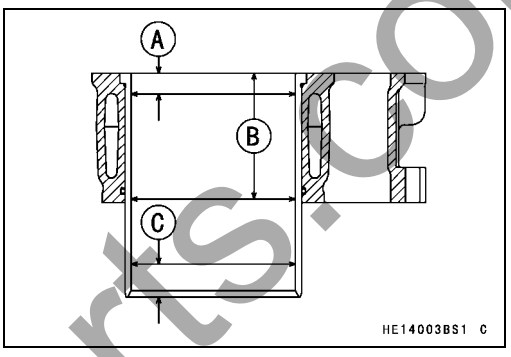
- Install:
  Chain Guide [B]
- Apply grease to the O-rings on the oil pipe [C], and insert the pipe.



Cylinder Wear Inspection

- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the three locations (total of six measurements) shown in the figure.

★If any of the cylinder inside diameter measurements exceeds the service limit, replace the cylinder.
  10 mm (0.4 in.) [A]
  60 mm (2.4 in.) [B]
  20 mm (0.8 in.) [C]



Cylinder Inside Diameter

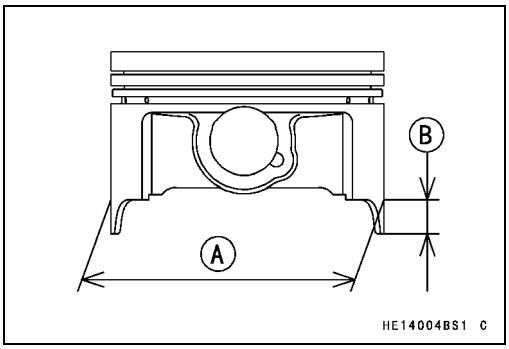
Standard: **84.994 ~ 85.006 mm (3.3462 ~ 3.3467 in.), and less than 0.01 mm (0.0004 in.) difference between any two measurements.**

Service Limit: **85.09 mm (3.3500 in.), or more than 0.05 mm (0.0020 in.) difference between any two measurements.**

Piston Wear Inspection

- Measure the outside diameter [A] of each piston 5 mm (0.20 in.) [B] up from the bottom of the piston at a right angle to the direction of the piston pin.

★If the measurement is under service limit, replace the piston.



Piston Diameter

Standard: **84.964 ~ 84.979 mm (3.3450 ~ 3.3456 in.)**

Service Limit: **84.81 mm (3.3390 in.)**

Piston/Cylinder Clearance Inspection

- Subtract the piston diameter from the cylinder inside diameter to get the piston/cylinder clearance.

Piston/Cylinder Clearance

Standard: **0.015 ~ 0.042 mm (0.0006 ~ 0.0017 in.)**

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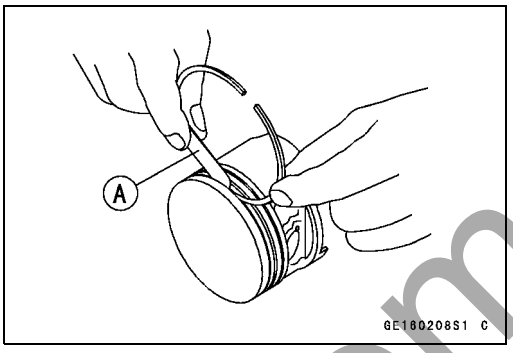
Cylinder and Piston

Piston Ring, Piston Ring Groove Wear Inspection



- Check for uneven groove wear by inspecting the ring seating.

★The rings should fit perfectly parallel to groove surfaces. If not, replace the piston and all the piston rings.

- With the piston rings in their grooves, make several measurements with a thickness gauge [A] to determine piston ring/groove clearance.

Piston Ring/Groove Clearance
Standard:

Top	**0.04 ~ 0.08 mm (0.0016 ~ 0.0031 in.)**
Second	**0.03 ~ 0.07 mm (0.0012 ~ 0.0028 in.)**

Service Limit:

Top	**0.18 mm (0.0071 in.)**
Second	**0.17 mm (0.0067 in.)**

★If the piston ring/groove clearance is greater than the service limit, measure the ring thickness and groove width as follows to decide whether to replace the rings, the piston or both.

Piston Ring Groove Width Inspection

- Measure the piston ring groove width.

○Use a vernier caliper at several points around the piston.

Piston Ring Groove Width
Standard:

Top	**1.03 ~ 1.05 mm (0.0406 ~ 0.0413 in.)**
Second	**1.02 ~ 1.04 mm (0.0402 ~ 0.0409 in.)**

Service Limit:

Top	**1.13 mm (0.0445 in.)**
Second	**1.12 mm (0.0441 in.)**

★If the width of any of the two grooves is wider than the service limit at any point, replace the piston.

Piston Ring Thickness Inspection

- Measure the piston ring thickness.

○Use a micrometer to measure at several points around the ring.

Piston Ring Thickness
Standard:

Top	**0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)**
Second	**0.97 ~ 0.99 mm (0.0382 ~ 0.0390 in.)**

Service Limit:

Top	**0.90 mm (0.0354 in.)**
Second	**0.90 mm (0.0354 in.)**

★If any of the measurements is less than the service limit on either of the rings, replace all the rings.

NOTE

○*When using new rings in a used piston, check for uneven groove wear. The rings should fit perfectly parallel to the groove sides. If not, replace the piston.*

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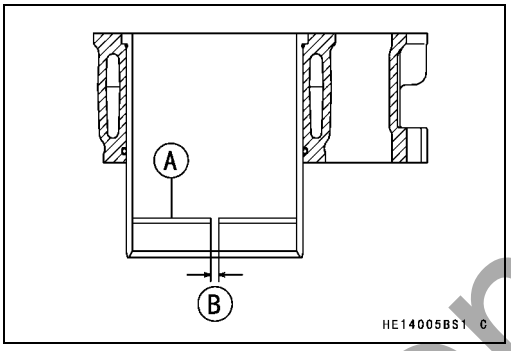
Cylinder and Piston

Piston Ring End Gap Inspection



- Place the piston ring [A] inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.
- Measure the gap [B] between the ends of the ring with a thickness gauge.

Piston Ring End Gap

Standard:

Top	**0.15 ~ 0.25 mm (0.0059 ~ 0.0098 in.)**
Second	**0.30 ~ 0.45 mm (0.0118 ~ 0.0177 in.)**
Oil	**0.20 ~ 0.70 mm (0.0079 ~ 0.0276 in.)**

Service Limit:

Top	**0.55 mm (0.0217 in.)**
Second	**0.75 mm (0.0295 in.)**
Oil	**1.00 mm (0.0394 in.)**

★If the end gap of either ring is greater than the service limit, replace all the rings.

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Exhaust System

This vehicle is equipped with a spark arrester approved for off-road use by the United States Forest Service. It must be properly maintained to ensure its efficiency. In accordance with the Periodic Maintenance Chart, clean the spark arrester.

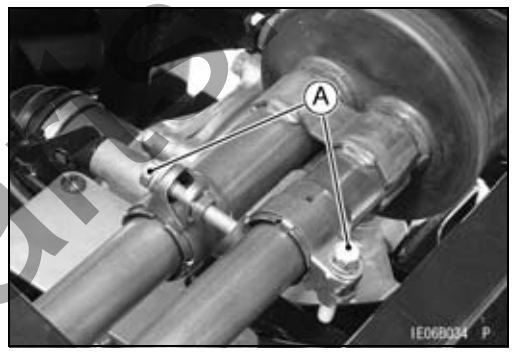
Spark Arrester Cleaning

- Refer to the Spark Arrester Cleaning in the Periodic Maintenance chapter.

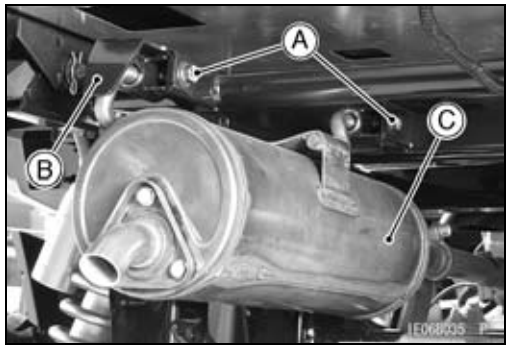
Muffler and Exhaust Pipe Removal

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Engine Bottom Guard (see Engine Bottom Guard Removal in the Frame chapter)

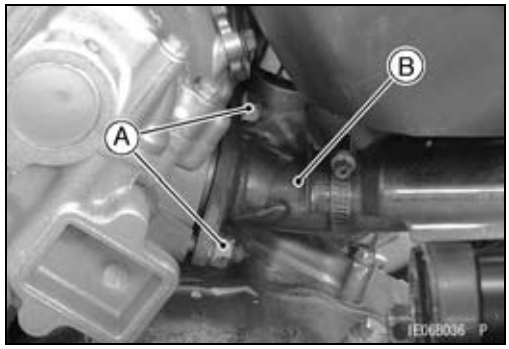
- Loosen:
  Muffler Clamp Bolts [A] (both sides)



- Remove:
  Muffler Mounting Bolts [A] and Washers
  Bracket [B]
  Muffler [C]



- Remove:
  Rear Exhaust Pipe Nuts [A]
  Rear Exhaust Pipe [B]



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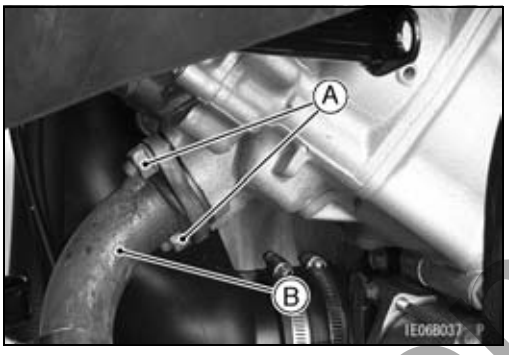
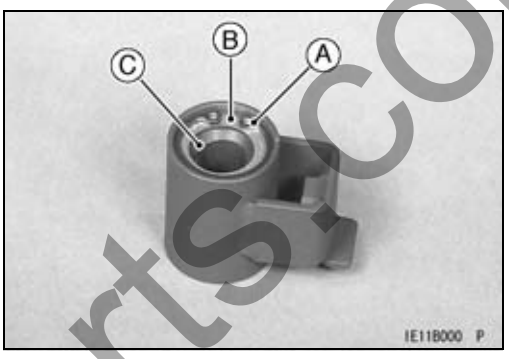
Exhaust System

- Remove:
  Front Exhaust Pipe Nuts [A]
  Front Exhaust Pipe [B]



- Remove:
  Circlips [A] and Washers [B] (both sides)

  Special Tool - Inside Circlip Pliers: 57001-143
- Remove:
  Damper [C]



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Exhaust System

Exhaust System Inspection

- Before removing the exhaust system, check for signs of leakage at the exhaust pipe gasket in the cylinder head and at the muffler clamp.

★If there are signs of leakage around the exhaust pipe gasket, it should be replaced. If the muffler-to-exhaust pipe joint leaks, tighten the clamp.

- Remove the exhaust pipe and muffler (see Muffler and Exhaust Pipe Removal).
- Inspect the gasket for damage and signs of leakage.

★If the gasket is damaged or has been leaking, replace it.

- Check the exhaust pipe and muffler for dents, cracks, rust and holes.

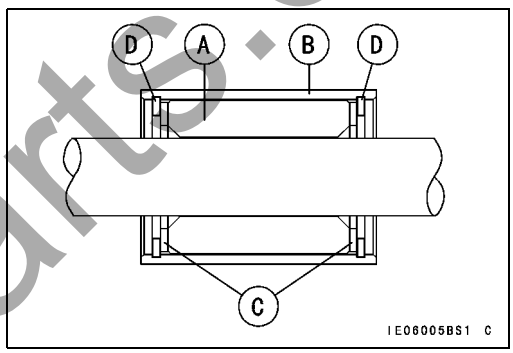
★If the exhaust pipe or muffler is damaged or has holes, it should be replaced for best performance and least noise.

Muffler and Exhaust Pipe Installation

- When installing the muffler bracket dampers [A], do as follows.
- Install the following parts in the muffler bracket [B].
  Muffler Bracket Damper
  Washers [C]
  New Circlips [D]

Special Tool - Inside Circlip Pliers: 57001-143

- Install the muffler brackets to the muffler.



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Exhaust System

● When installing the exhaust pipe covers [A], do as follows.
○Install:
Exhaust Pipe Covers
Collars [B]
Dampers [C]
Washers [D]
Exhaust Pipe Cover Bolts [E]
○Tighten:

Torque - Exhaust Pipe Cover Bolts: 13 N·m (1.3 kgf·m, 115 in·lb)

○Install the cover clamp screws [F] as shown in the figure.
● Replace the exhaust pipe gaskets [G] with new ones.
● Install:
New Exhaust Pipe Gaskets
Front Exhaust Pipe [H] and Exhaust Pipe Nuts (lightly)
Rear Exhaust Pipe [I] and Exhaust Pipe Nuts (lightly)
● Replace and muffler gasket with new ones.
● Install the new muffler gasket [J], collar [K] and clamp [L] to the front side inlet pipe of the muffler as follows.
○Install the new muffler gasket more deeply than the first wide ditch [M] of the inlet pipe and contact the clamp claws [N] to the bottom [O] of the ditch.
● Install the new muffler gasket [P], collar [K] and clamp [Q] to the rear side inlet pipe of the muffler as follows.
○Install the new muffler gasket to the bottom of the inlet pipe.
○The distance [R] between the inlet pipe end and gasket end is 8 ±0.5 mm (0.31 ±0.02 in.).
○Install the collar more deeply than the first wide ditch [S] of the rear side inlet pipe and contact the clamp claws [T] to the bottoms [U] of the ditch.
● Install the muffler to the exhaust pipes.
● Install the muffler bracket [V] to the bracket [W] of the frame side.
● Install:
Washer and Muffler Mounting Bolts [X] (lightly)
● Tighten:

Torque - Exhaust Pipe Nuts [Y]: 17 N·m (1.7 kgf·m, 13 ft·lb)

● Push the muffler to front, and then confirm that the gasket entered into the muffler.
● Tighten the muffler clamp bolts [Z] in the direction of the figure.

Torque - Muffler Clamp Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

● Tighten:

Torque - Muffler Mounting Bolts: 28 N·m (2.9 kgf·m, 21 ft·lb)

● After installation, thoroughly warm up the engine, wait until the engine cools down, and then retighten the exhaust pipe nuts, muffler clamp bolts and muffler mounting bolts.

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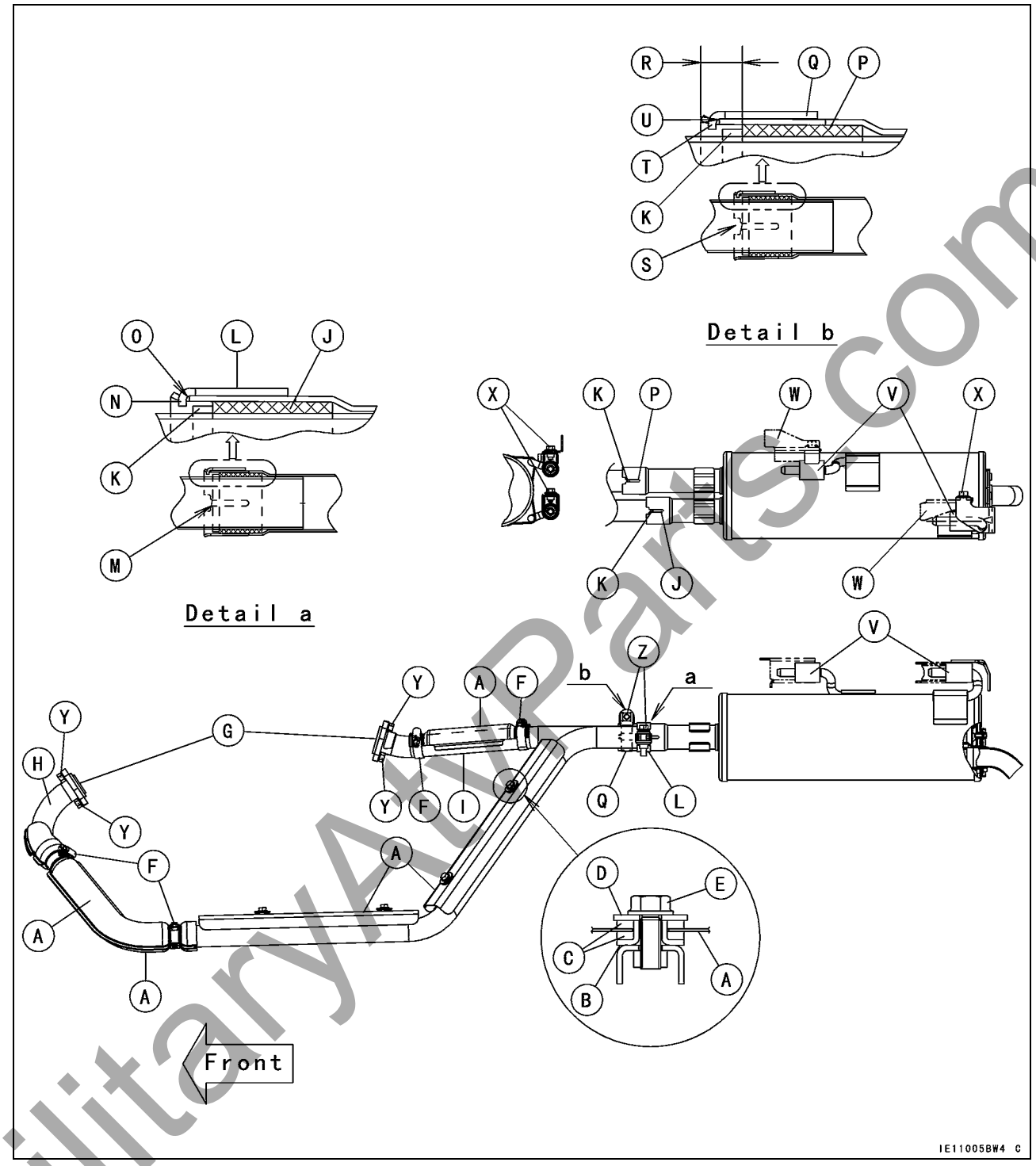
Exhaust System



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Converter System

Table of Contents

Exploded View 6-2
Specifications 6-6
Special Tools 6-7
Torque Converter Cover 6-9
- Torque Converter Cover Removal 6-9
- Torque Converter Cover Installation 6-9
- Torque Converter Cover Disassembly 6-10
- Actuator Lever (Engine Brake Control Lever) Assembly Inspection 6-11
- Torque Converter Cover Assembly 6-11

Drive Belt 6-13
- Drive Belt Removal 6-13
- Drive Belt Installation 6-13
- Drive Belt Deflection Inspection 6-13
- Drive Belt Deflection Adjustment 6-13
- Drive Belt Inspection 6-13

Drive Pulley 6-14
- Drive Pulley Removal 6-14
- Drive Pulley Disassembly 6-14
- Drive Pulley Inspection 6-15
- Spider Shoe Side Clearance Inspection/Adjustment 6-17
- Drive Pulley Assembly 6-18
- Drive Pulley Installation 6-20

Driven Pulley 6-22
- Driven Pulley Removal 6-22
- Driven Pulley Disassembly 6-22
- Driven Pulley Inspection 6-23
- Driven Pulley Assembly 6-24
- Driven Pulley Installation 6-26

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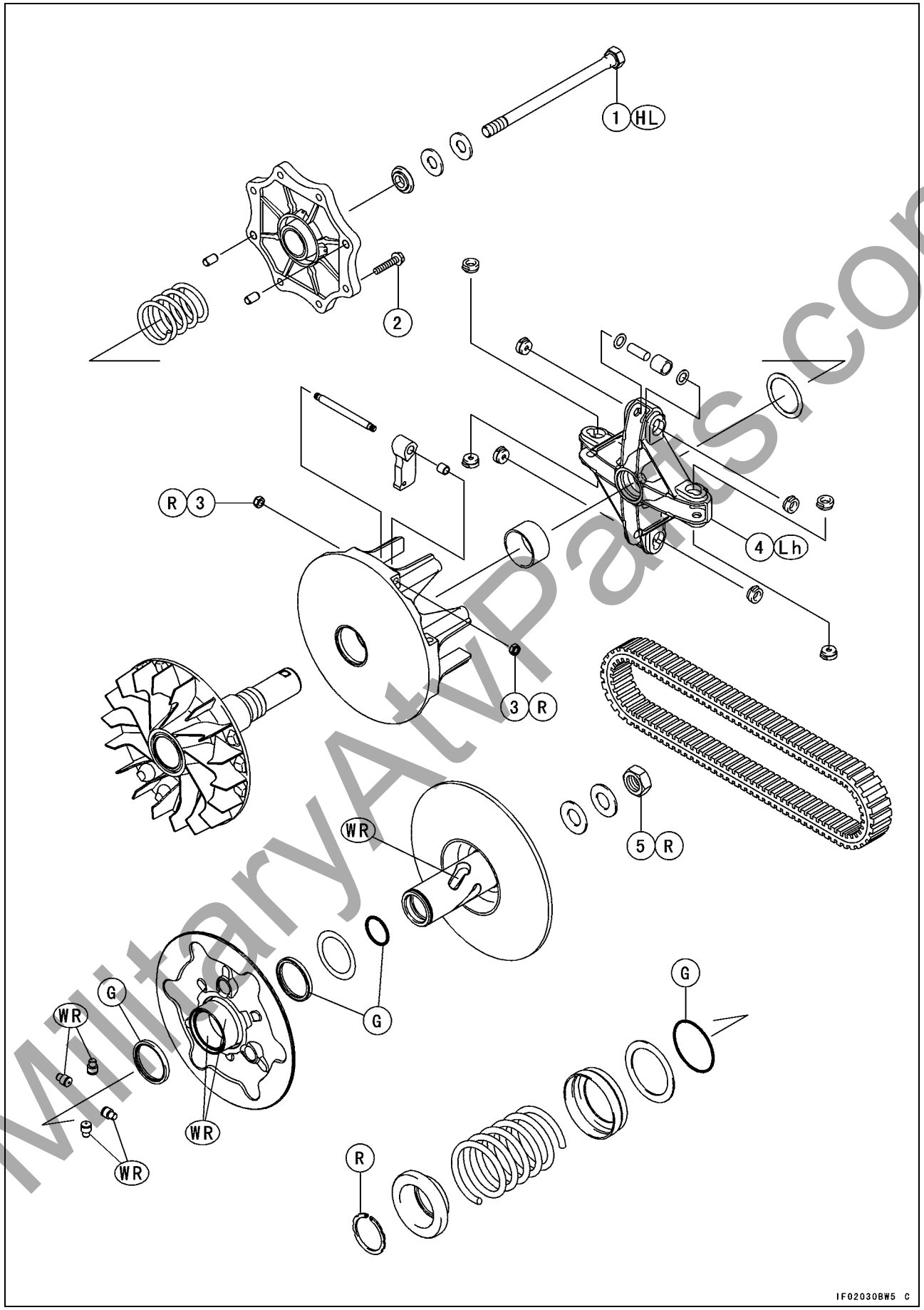
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Drive Pulley Bolt	93	9.5	69	Lh
2	Drive Pulley Cover Bolts	12.5	1.3	111 in·lb	
3	Ramp Weight Nuts	7.0	0.71	62 in·lb	R
4	Spider	275	28	203	Lh
5	Driven Pulley Nut	93	9.5	69	R

G: Apply grease.
Lh: Left-hand Threads
R: Replacement Parts
WR: Apply grease (WR500-No2. KYODO YUSHI, POWER LITE WR #2 KYODO YUSHI, or SERAN -HV TOTAL FINA).

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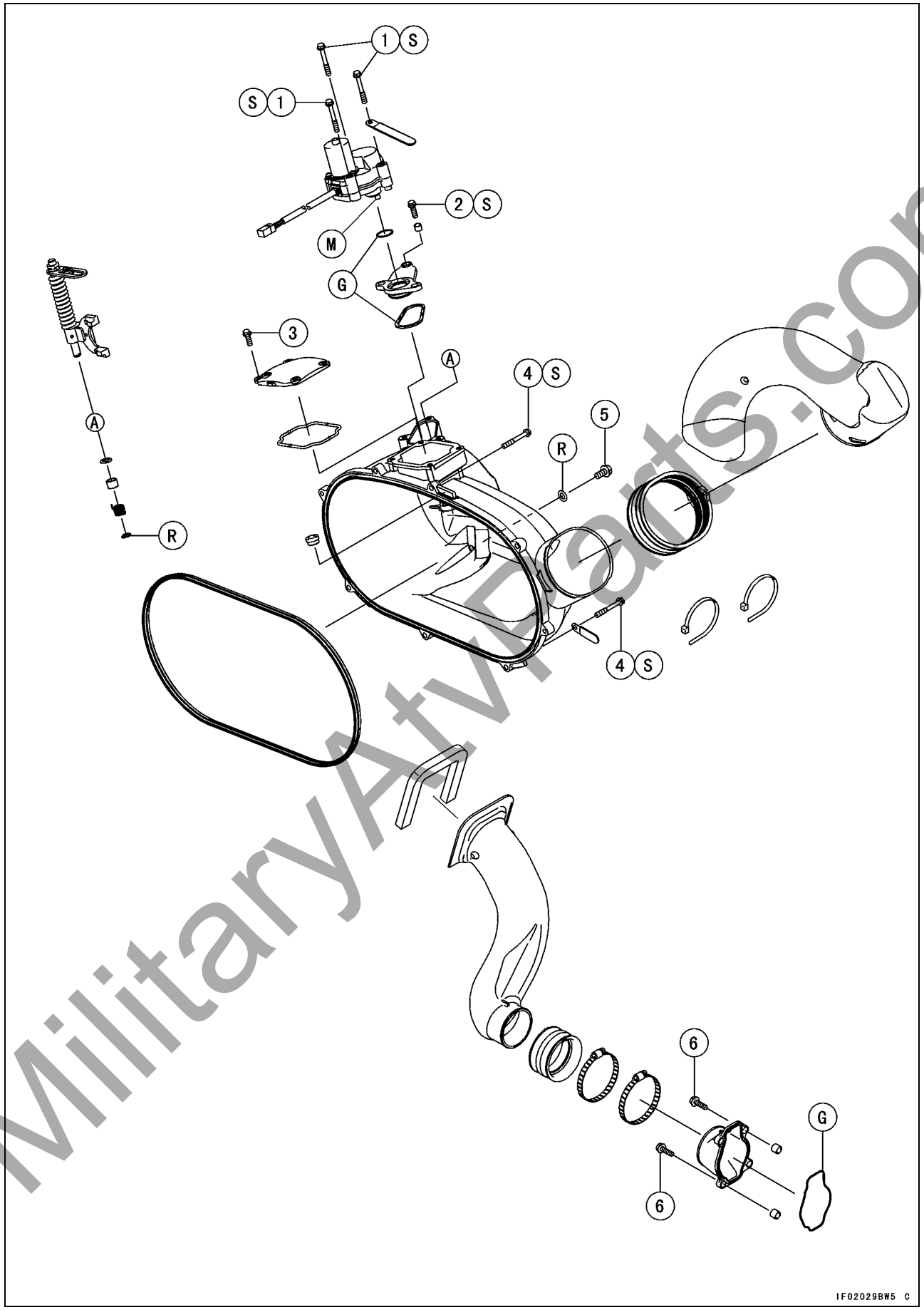
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Brake Actuator Mounting Bolts	8.8	0.90	78 in·lb	S
2	Engine Brake Actuator Cover Bolt	8.8	0.90	78 in·lb	S
3	Belt Inspection Opening Cover Bolts	8.8	0.90	78 in·lb	
4	Converter Cover Bolts	8.8	0.90	78 in·lb	S
5	Converter Cover Drain Bolt	20	2.0	15	
6	Joint Duct Bolts	8.8	0.90	78 in·lb	

G: Apply grease.
M: Apply molybdenum disulfide grease.
R: Replacement Parts
S: Follow the specific tightening sequence.

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Specifications

Item	Standard	Service Limit
Torque Converter		
Actuator Lever Guide Shoe	– – –	6 mm (0.24 in.)
Actuator Lever Assembly Installation Length	164.63 ~ 165.77 mm (6.481 ~ 6.526 in.)	– – –
Drive Belt		
Belt Width	30.0 ~ 30.6 mm (1.181 ~ 1.205 in.)	28.6 mm (1.126 in.)
Belt Deflection	22 ~ 31 mm (0.87 ~ 1.22 in.) (at checking) 22 ~ 27 mm (0.87 ~ 1.06 in.) (at adjusting)	– – –
Drive Pulley		
Shoe Side Clearance	Up to 0.20 mm (0.008 in.) (in the text)	– – –
Cover Bushing Inside Diameter	27.985 ~ 28.085 mm (1.1018 ~ 1.1057 in.)	28.12 mm (1.107 in.)
Sheave Bushing Inside Diameter	37.985 ~ 38.085 mm (1.4955 ~ 1.4994 in.)	38.12 mm (1.501 in.)
Spring Free Length	60.0 mm (2.36 in.)	– – –
Drive Pulley Installation Length	164.85 ~ 165.95 mm (6.490 ~ 6.533 in.)	– – –
Driven Pulley		
Sheave Bushing Inside Diameter	40.000 ~ 40.039 mm (1.5748 ~ 1.5763 in.)	40.07 mm (1.578 in.)
Spring Free Length	99 mm (3.9 in.)	– – –

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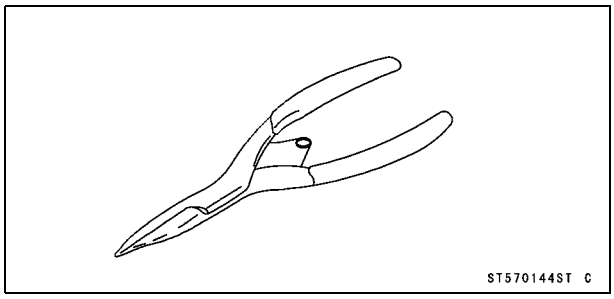
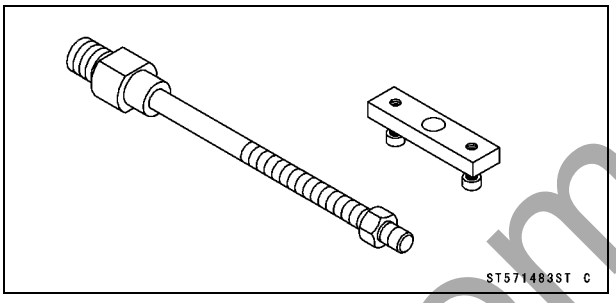
Special Tools

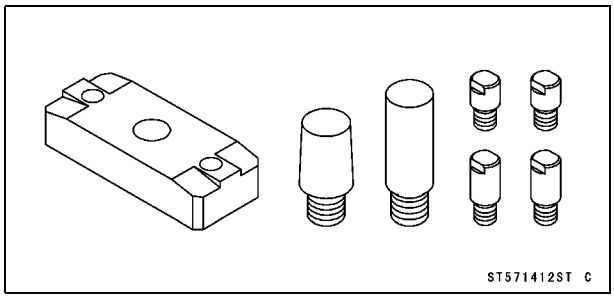
Outside Circlip Pliers:
57001-144



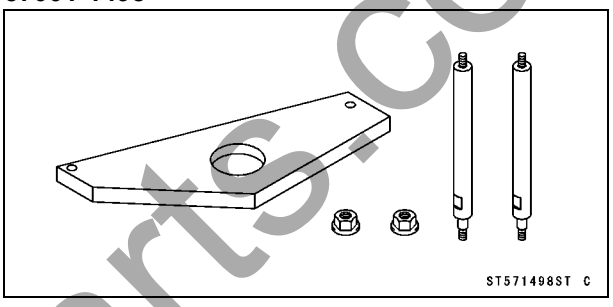
Spring Holder Set:
57001-1483



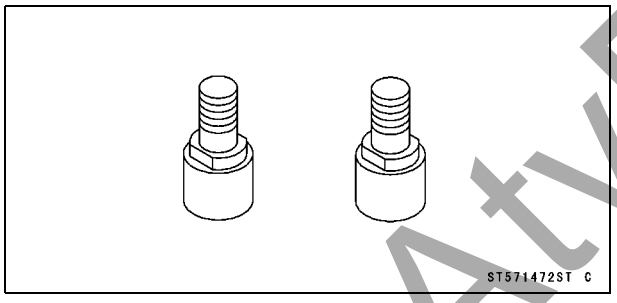
Drive & Driven Pulley Holder:
57001-1412



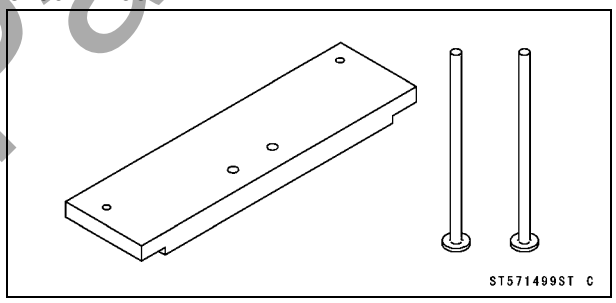
Drive Pulley Measurement Tool:
57001-1498



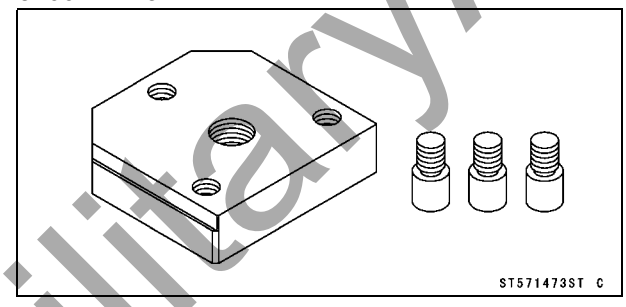
Pulley Holder Attachment:
57001-1472



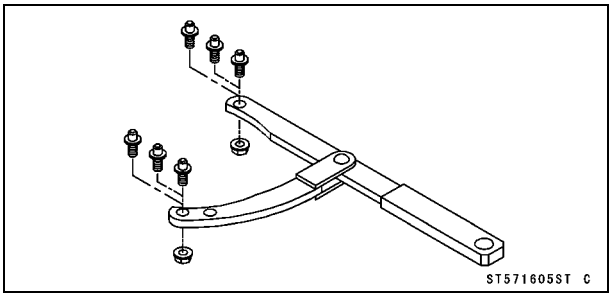
Actuator Lever Measurement Tool:
57001-1499



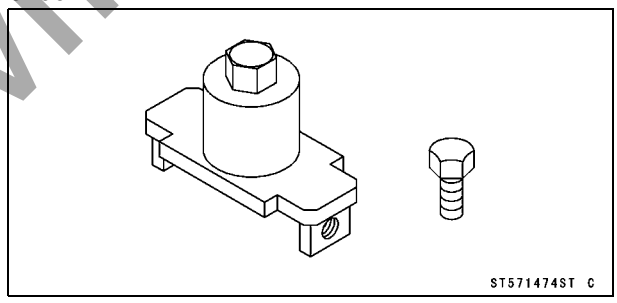
Drive & Driven Pulley Holder:
57001-1473



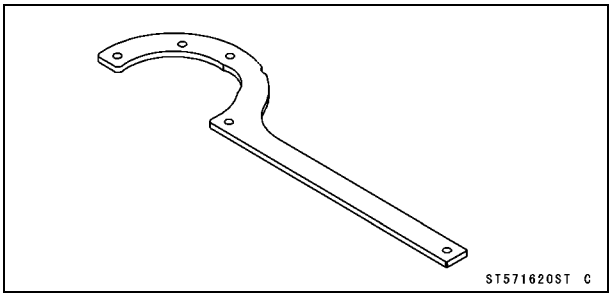
Flywheel & Pulley Holder:
57001-1605



Drive Pulley Wrench:
57001-1474



Drive Pulley Holder:
57001-1620



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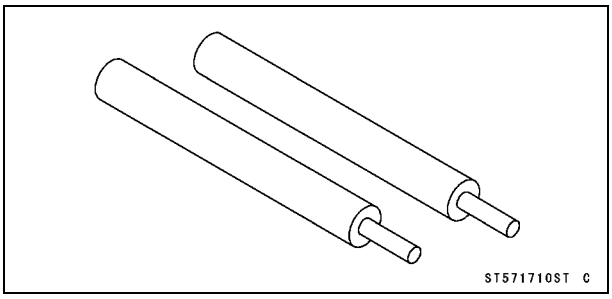
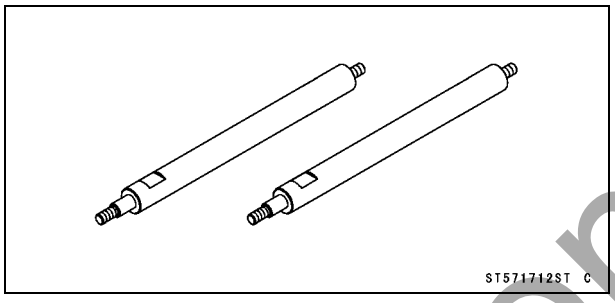
Special Tools

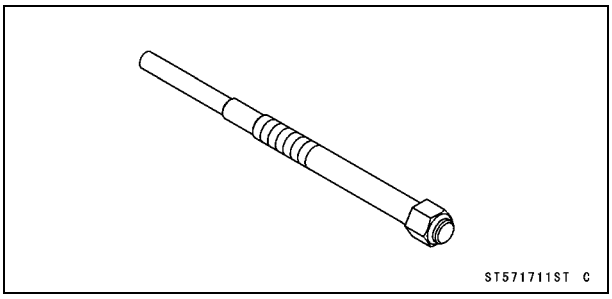
Rod:
57001-1710



Leg:
57001-1712



Puller Bolt:
57001-1711



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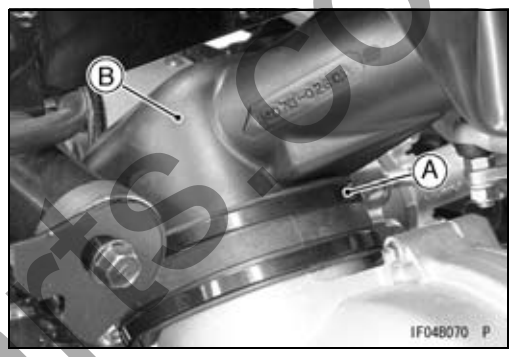
Torque Converter Cover

⚠ WARNING

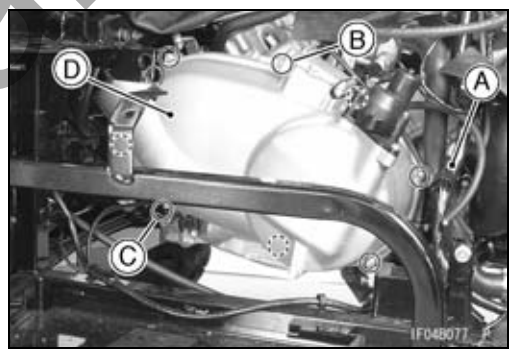
Excessive imbalance or operating rpm could cause torque converter pulley failure resulting in severe injury or death. The pulleys of the belt drive torque converter are precision balanced components designed to operate within certain rpm limits. Disassembly/assembly and servicing procedures of the pulley assemblies must be followed closely. Modifications to the engine or pulleys that increase rpm may cause failure.

Torque Converter Cover Removal

- Remove:
  Fuel Tank (see Fuel Tank Removal in the Fuel System chapter)
  Right Frame Pipe (see Right Frame Pipe Removal in the Frame chapter)
  Band [A] (cut)
  Air Outlet Duct [B]

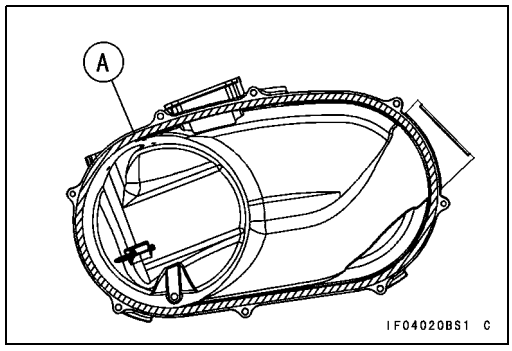


- Remove:
  Actuator Lead Connector [A]
  Torque Converter Cover Bolts [B]
  Clamp [C]
  Torque Converter Cover [D]



Torque Converter Cover Installation

- Check the actuator lever assembly installation length (see Torque Converter Cover Assembly).
- Fit the trim seal [A] into the converter cover.



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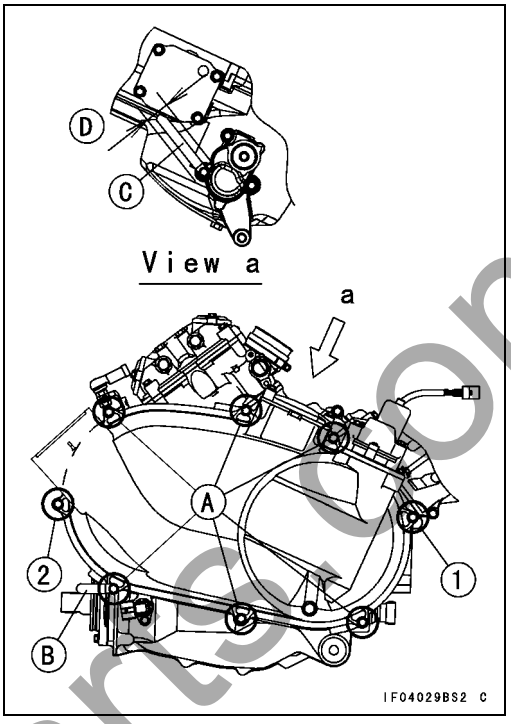
Torque Converter Cover

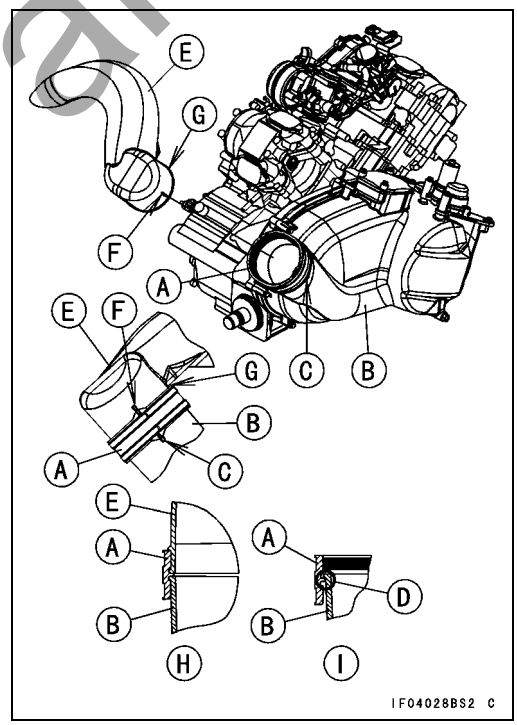
● Tighten the two cover bolts following the tightening sequence [1, 2] and tighten the other bolts [A] in arbitrary order.
[B] Clamp

Torque - Converter Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

● Install the clamp [C] in this area [D] (about 30 mm (1.2 in.)).

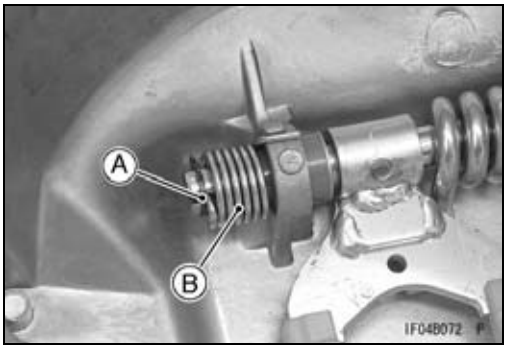


● Install the rubber duct [A] to the converter cover [B].
○Fit the projection [C] of the converter cover into the slit of the rubber duct.
○Do not run up [D] the rubber duct onto the converter cover.
● Install the duct [E] to the rubber duct.
○Fit the projection [F] of the duct into the slit of the rubber duct.
○Push the duct until the rib [G] of the duct touches the rubber duct.
Right [H]
Wrong [I]
● Tighten the bands on the rubber duct.



Torque Converter Cover Disassembly

● Remove:
Torque Converter Cover (see Torque Converter Cover Removal)
Engine Brake Actuator (see Engine Brake Actuator Removal in the Electrical System chapter)
Circlip [A]
Spring [B]



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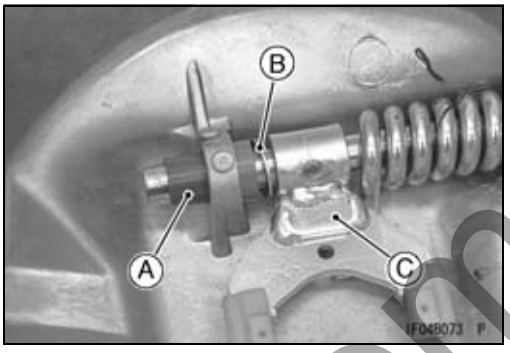
Torque Converter Cover

- Remove:
  Bushing [A]
  Washer [B]
  Actuator Lever Assembly [C]

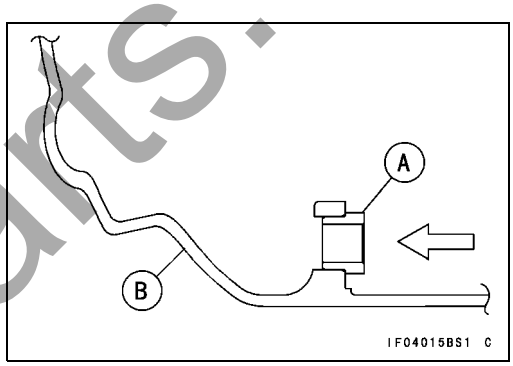


Actuator Lever (Engine Brake Control Lever) Assembly Inspection

- Refer to the Actuator Lever (Engine Brake Control Lever) Assembly Inspection in the Periodic Maintenance chapter.

Torque Converter Cover Assembly

- When installing the bushing [A] into the cover [B], press it until it is stopped as shown in the figure.

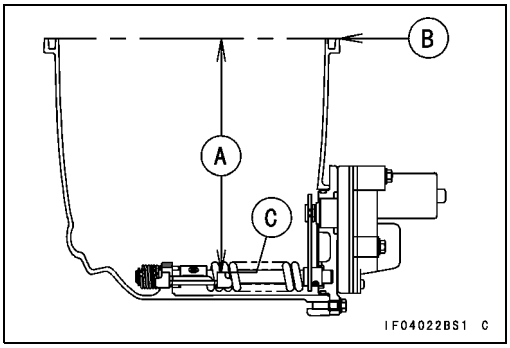


- Install:
  Actuator Lever Assembly
  Washer
  Bushing
  Spring
  New Circlip
  Engine Brake Actuator (see Engine Brake Actuator Installation in the Electrical System chapter)

Torque - Engine Brake Actuator Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Measure the installation length [A] of the actuator lever assembly between the cover end [B] and resin tips [C] on the actuator lever assembly as follows:

Actuator Lever Assembly Installation Length
Standard: 164.63 ~ 165.77 mm (6.481 ~ 6.526 in.)



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Torque Converter Cover

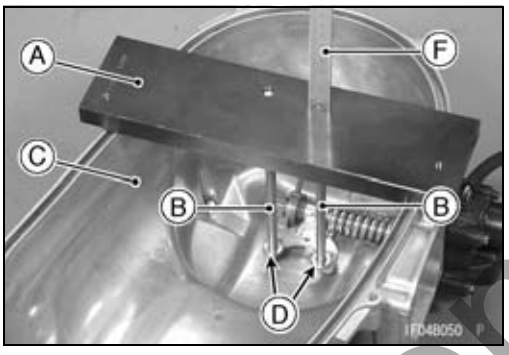
○Remove the trim seal.
○Install the actuator lever measurement tool (plate [A] and rods (57001-1710) [B]) on the torque converter cover [C] and tighten the two cover bolts.

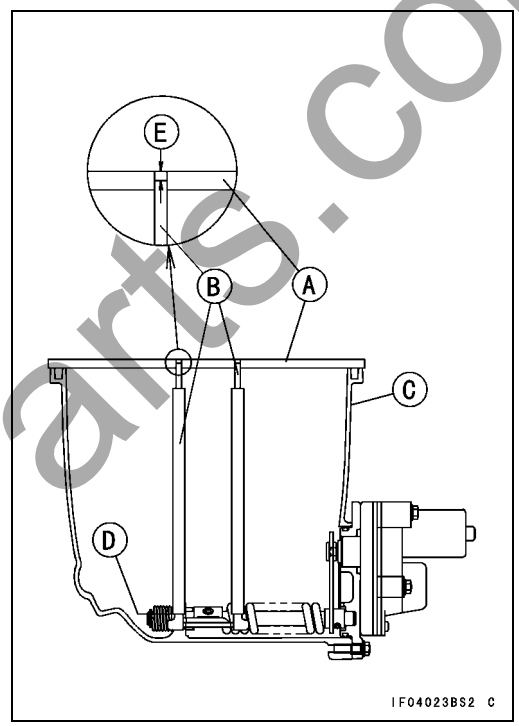
Special Tools - Actuator Lever Measurement Tool: 57001 -1499
Rod: 57001-1710

○Set the rod ends on the resin tips [D].
○Measure the recess length [E] between the plate and rods with Vernier calipers [F] or depth gauge.

Measurement Length [E]
Standard: 1.33 ~ 2.47 mm (0.052 ~ 0.097 in.)

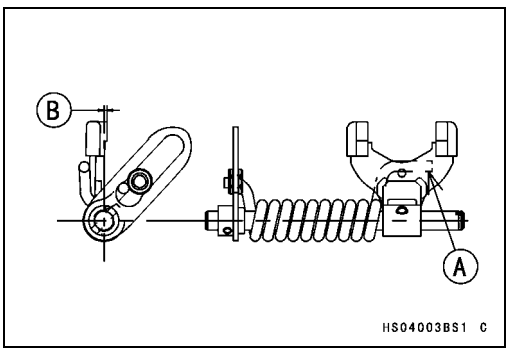
★If the measurement is less than 1.33 mm (0.052 in.), use the actuator lever assembly (13236-0123) of yellow paint.
★If the measurement is more than 2.47 mm (0.097 in.), use the actuator lever assembly (13236-0124) of green paint.
★If the length is not within the specified length after the actuator lever assembly is replaced, replace the torque converter cover, and install the actuator lever assembly (13236-0125).





Actuator Lever Assemblies

Part Number	Paint Color [A]	Length [B]
13236-0123	Yellow	0.4 ±0.1 mm (0.016 ±0.004 in.)
13236-0125	None	1.0 ±0.1 mm (0.039 ±0.004 in.)
13236-0124	Green	1.6 ±0.1 mm (0.063 ±0.004 in.)



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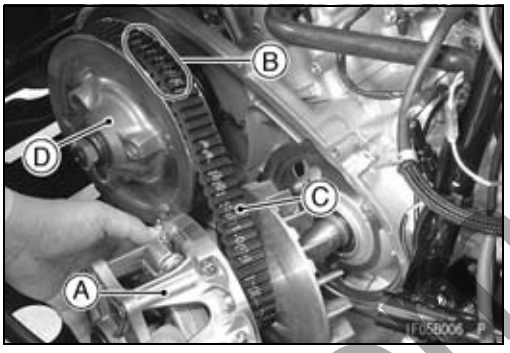
Drive Belt

Drive Belt Removal



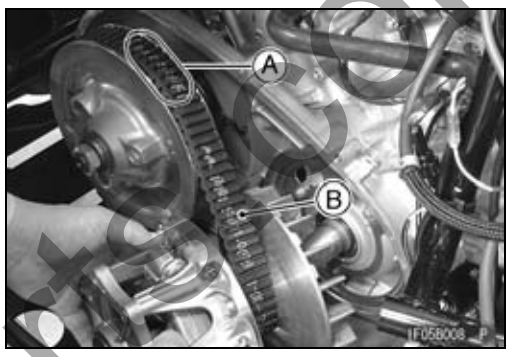
- Remove the drive pulley [A] (see Drive Pulley Removal).

NOTE

○*Before removing, observe the direction the belt's printed information [B] (such as manufacturer's name) is facing so that it may be reinstalled on the pulleys to rotate in the same direction as originally installed.*

- Lift the drive belt [C] off the driven pulley [D].

Drive Belt Installation



NOTE

○*Be sure the printed information faces the same direction so the belt rotates in the same direction as originally installed. When installing a new belt, install it so the printed information [A] can be read from beside the vehicle.*

- Installation is basically the reverse of removal.
- Loop the belt [B] over the drive and driven pulleys.
- Install the drive pulley (see Drive Pulley Installation).
- Put the transmission in neutral, and rotate the driven pulley to allow the belt to return to the top [A] of the sheaves, before measuring belt deflection.

Drive Belt Deflection Inspection

- Refer to the Drive Belt Deflection Inspection in the Periodic Maintenance chapter.

Drive Belt Deflection Adjustment

- Refer to the Drive Belt Deflection Adjustment in the Periodic Maintenance chapter.

Drive Belt Inspection

- Refer to the Drive Belt Inspection in the Periodic Maintenance chapter.

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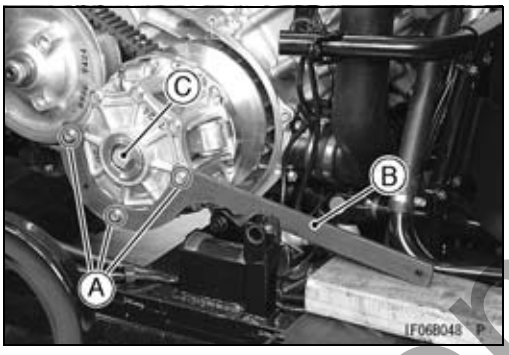
Drive Pulley

Drive Pulley Removal



- Remove the torque converter cover (see Torque Converter Cover Removal).
- Remove the three cover bolts [A] and install the drive pulley holder [B].

  Special Tool - Drive Pulley Holder: 57001-1620
- Tighten the three cover bolts:

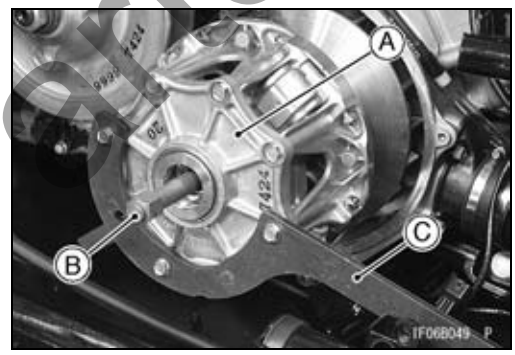
  Torque - Drive Pulley Cover Bolts: 12.5 N·m (1.3 kgf·m, 111 in·lb)
- Loosen the drive pulley bolt [C] (left-hand threads), holding the drive pulley with the drive pulley holder.

NOTE

○*The drive pulley bolt has left-hand threads. Turn the wrench clockwise for loosening.*

- Remove the drive pulley bolt, two washers, and the stepped washer, but do not remove the drive pulley holder yet.
- Remove the drive pulley [A] from the crankshaft by screwing the drive pulley puller bolt [B] **clockwise**, while holding the drive pulley with the drive pulley holder [C].

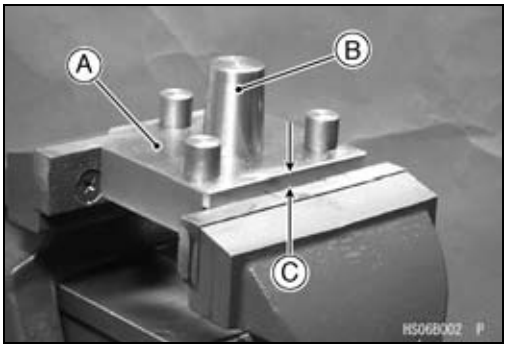
  Special Tools - Puller Bolt: 57001-1711
  Drive Pulley Holder: 57001-1620



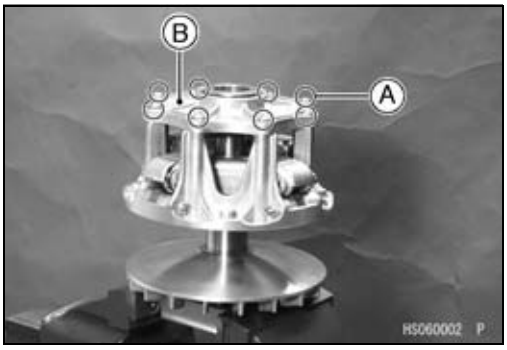
Drive Pulley Disassembly

- Hold the drive & driven pulley holder (57001-1473) [A] and the tapered guide of the holder (57001-1412) [B] in a vise so that the upper surface on the holder is 7 mm (0.28 in.) [C] above the vise.

  Special Tools - Drive & Driven Pulley Holder: 57001-1473
  Drive & Driven Pulley Holder: 57001-1412



- Set the pulley onto the pulley holder.
- Remove:
  Drive Pulley Cover Bolts [A]
  Drive Pulley Cover [B]



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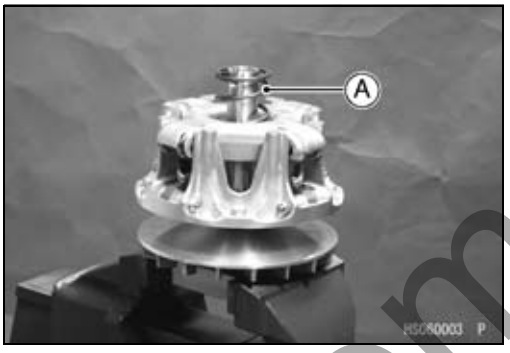
Drive Pulley

● Remove:
Spring [A]
Spacer



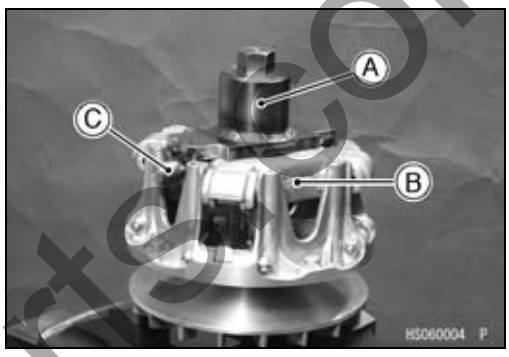
● Put the drive pulley wrench [A] on the spider [B] and tighten the bolt [C].

Special Tool - Drive Pulley Wrench: 57001-1474

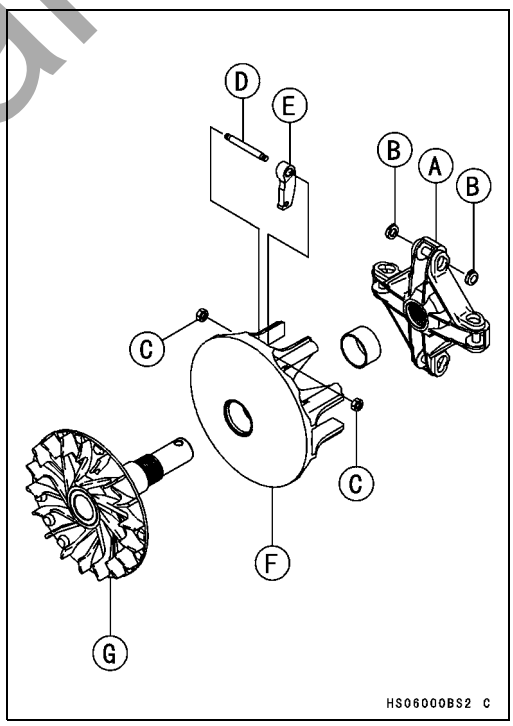
● Turn the wrench clockwise and remove the spider with the movable sheave.

NOTE

○*The spider has left-hand threads. Turn the wrench clockwise for loosening.*

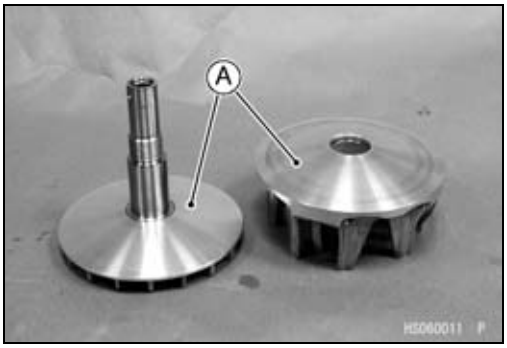


● Remove:
Spider [A]
Shoes [B]
Nuts [C]
Ramp Weight Pin [D]
Ramp Weight [E]
Movable Sheave [F]
Fixed Sheave [G]



Drive Pulley Inspection

★If the sheave surfaces [A] appear damaged, replace the sheaves.



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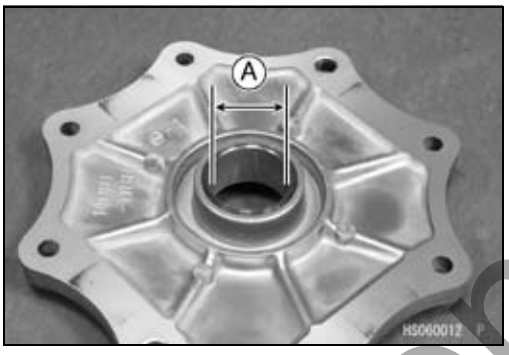
Drive Pulley

★If the cover bushing is damaged or worn, replace the drive pulley cover.

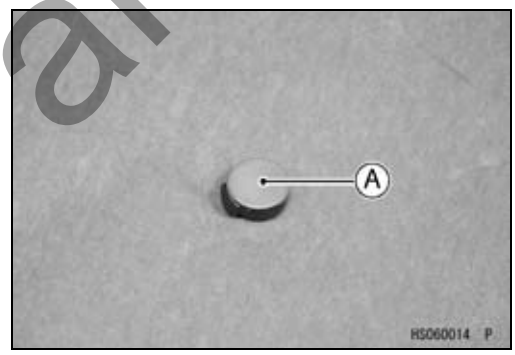
Cover Bushing Inside Diameter [A]
Standard: 27.985 ~ 28.085 mm (1.1018 ~ 1.1057 in.)
Service Limit: 28.12 mm (1.107 in.)



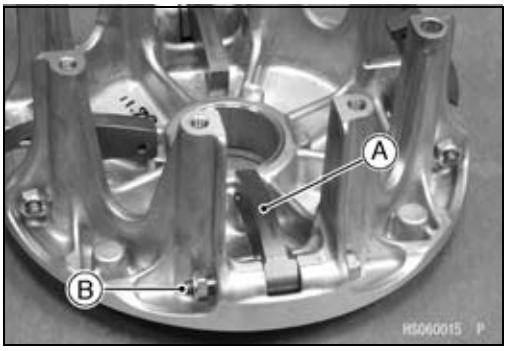
★If the sheave bushing is damaged or worn, replace it.

Sheave Bushing Inside Diameter [A]
Standard: 37.985 ~ 38.085 mm (1.4955 ~ 1.4994 in.)
Service Limit: 38.12 mm (1.501 in.)

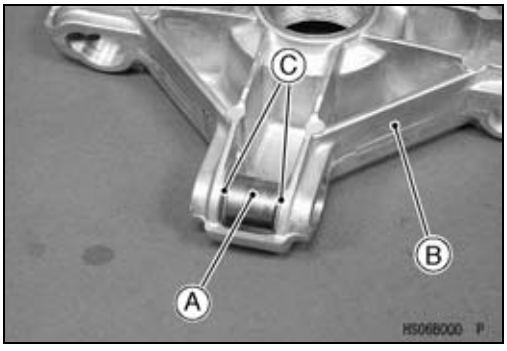
★If the spider shoes [A] are damaged, replace them.
● Check the spider shoe side clearance (see Spider Shoe Side Clearance Inspection).



★If the ramp weights [A] in the movable sheave are damaged or worn, replace them.
★If the pins [B] are damaged or worn, replace them.



★If the rollers [A] are damaged or worn, replace the spider [B].
★If the washers [C] are damaged or worn, replace the spider.



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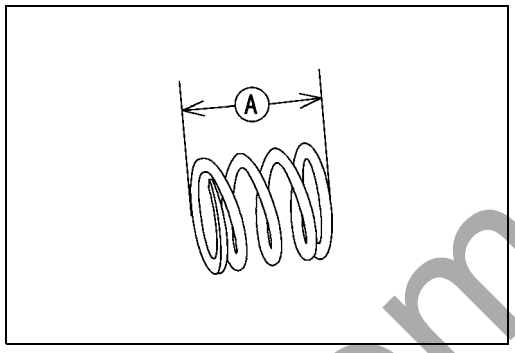
Drive Pulley

★If the spring is worn or damaged, replace the spring.

Spring Free Length [A]
Standard: 60.0 mm (2.36 in.)

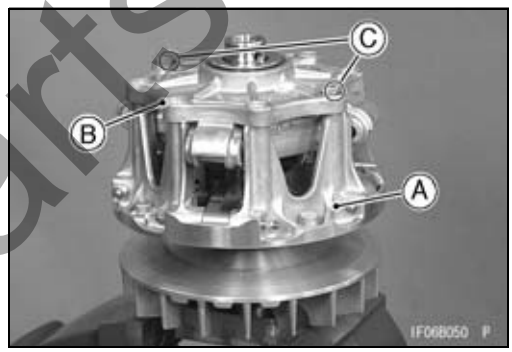


Spider Shoe Side Clearance Inspection/Adjustment

● Remove:
Drive Pulley (see Drive Pulley Removal)
Drive Pulley Cover and Spring (see Drive Pulley Disassembly)

● Set the drive pulley [A] without the spring onto the pulley holders (see Drive Pulley Disassembly).

Special Tools - Drive & Driven Pulley Holder: 57001-1473
Drive & Driven Pulley Holder: 57001-1412



● Temporarily install the following parts on the movable sheave.
Dowel Pins (2)
Drive Pulley Cover [B]
Two Bolts [C] (at dowel pins)

○Do not install the spring.

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Drive Pulley

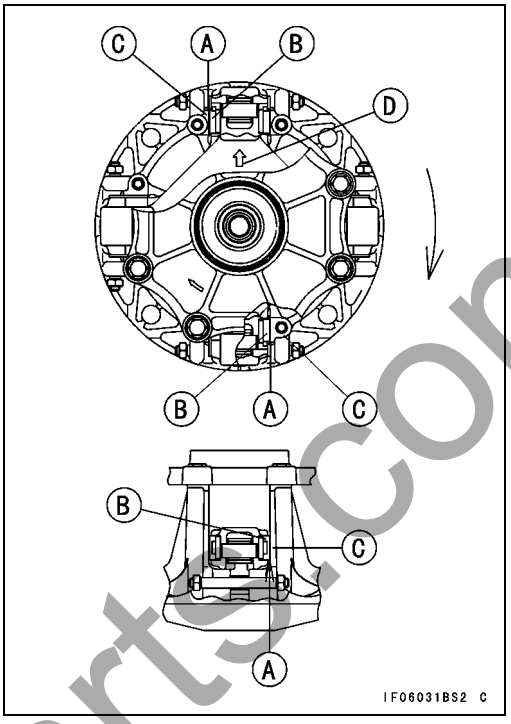
- Turn the spider clockwise.
- Measure the resulting clearance [A] between the shoe [B] and the post [C] on the movable sheave at two positions as shown.
  [D] Arrow Mark

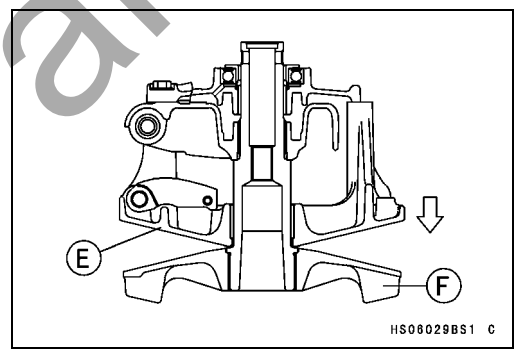
Shoe Side Clearance

Standard: up to 0.20 mm (0.008 in.), and there must be kept a clearance which the movable sheave [E] moves smoothly until it touches the fixed sheave [F] with its own weight.

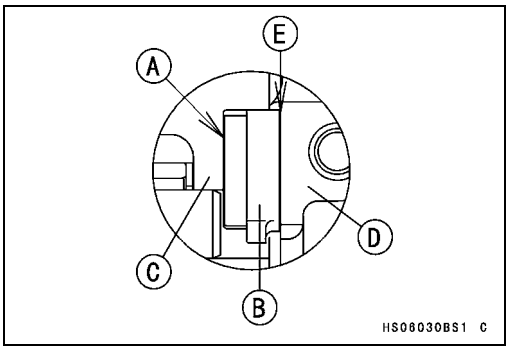
★If the clearance is not the specified range, adjust it using the following shoes.

	Part Number	Thickness
Standard Shoe	49048-1090	7.5 mm (0.295 in.)
Adjustment Shoes	49048-1087	7.2 mm (0.283 in.)
	49048-1088	7.3 mm (0.287 in.)
	49048-1089	7.4 mm (0.291 in.)
	49048-1091	7.6 mm (0.299 in.)
	49048-1092	7.7 mm (0.303 in.)
	49048-1093	7.8 mm (0.307 in.)
	49048-1094	7.9 mm (0.311 in.)
	49048-1095	8.0 mm (0.315 in.)



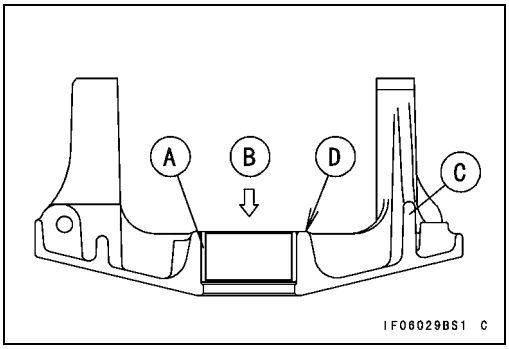


★If the clearance is not the specified range after the above shoes are replaced, use the spacer [A] (92026-0038) of the option part.
[B] Shoe
[C] Spider
[D] Post
[E] Clearance



Drive Pulley Assembly

- When installing the bushing [A], press [B] the bushing into the movable sheave [C] so that the bushing end is flush with the boss [D] of the sheave.



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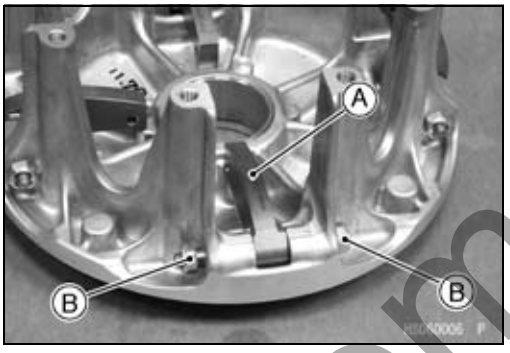
Drive Pulley

- Install the ramp weight [A] as shown.
- Replace the ramp weight nuts with new ones.
- Tighten:

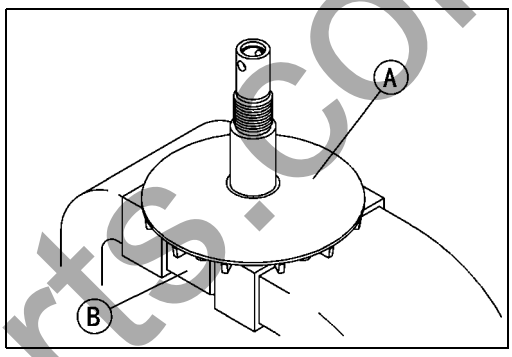
Torque - Ramp Weight Nuts [B]: 7.0 N·m (0.71 kgf·m, 62 in·lb)

- Check that the ramp weights swing smoothly.



- Hold the fixed sheave [A] with the drive pulley holder [B] in a vise.

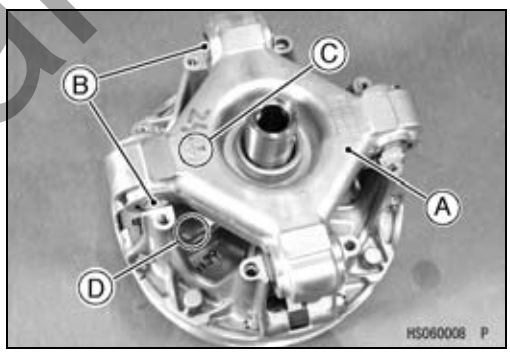
Special Tool - Drive & Driven Pulley Holder: 57001-1473



- Clean the threads of the fixed sheave and spider.
- Install:
  Movable Sheave
  Spider [A] and Shoes [B]

○Align the arrow [C] on the spider with the arrow [D] on the movable sheave.

○Insert the shoes so that the rubber side (black, small diameter) faces inward.



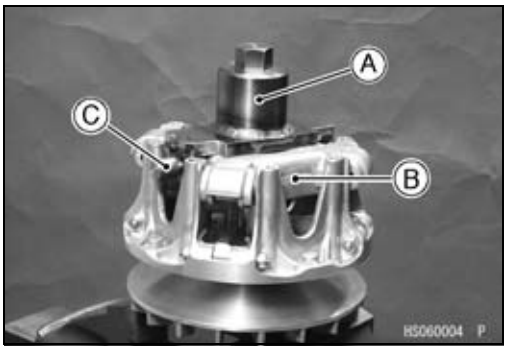
- Put the drive pulley wrench [A] on the spider [B] and tighten the bolt [C].

Special Tool - Drive Pulley Wrench: 57001-1474

- Turn the wrench counterclockwise for tightening.

Torque - Spider (left-hand threads): 275 N·m (28 kgf·m, 203 ft·lb)

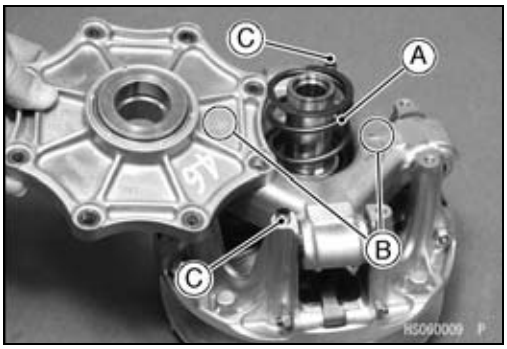
- Remove the drive pulley wrench.



- Install the spacer.
- Put the spring [A] in the groove of the spider.
- Align the arrows [B] on the drive pulley cover and spider.
- Install:
  Dowel Pins [C]
  Drive Pulley Cover
- Tighten:

Torque - Drive Pulley Cover Bolts: 12.5 N·m (1.3 kgf·m, 111 in·lb)

- Clean the surface of the sheaves with an oil-less cleaning fluid.



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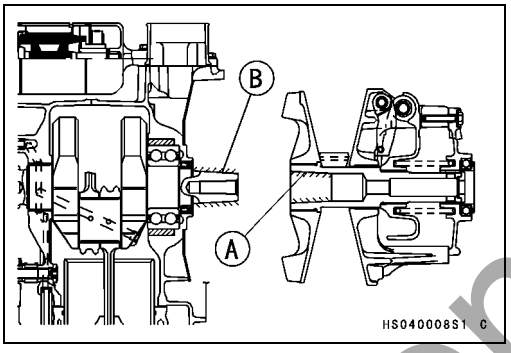
Drive Pulley

Drive Pulley Installation

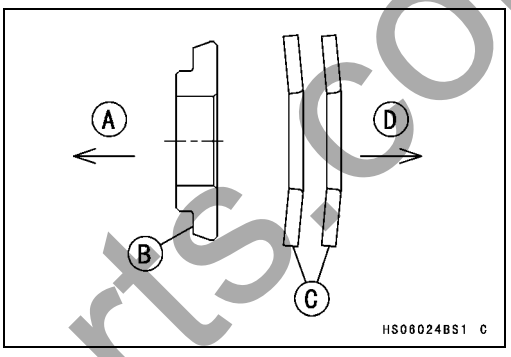
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Fixed Sheave Tapered Portion [A]
  Crankshaft Tapered Portion [B]



⚠ WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

- Install the drive pulley, stepped waster and two washers on the drive pulley bolt as shown.
  Crankcase Side [A]
  Stepped Washer [B]
  Two Washers [C]
  Bolt Head Side [D]

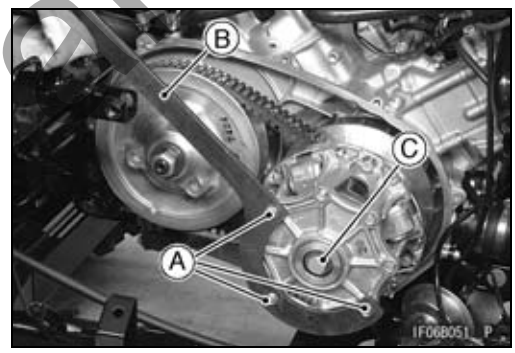


- Remove the three cover bolts [A] and install the drive pulley holder [B].

  Special Tool - Drive Pulley Holder: 57001-1620

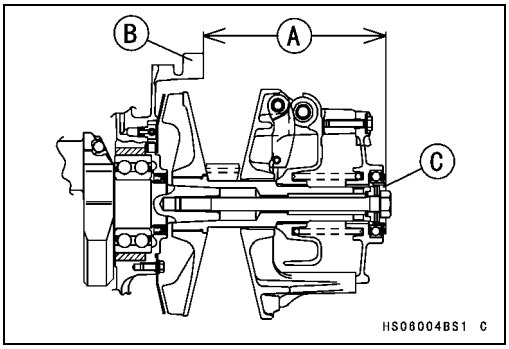
- Tighten:

  Torque - Drive Pulley Cover Bolts: 12.5 N·m (1.3 kgf·m, 111 in·lb)
  Drive Pulley Bolt [C] (new, left-hand threads): 93 N·m (9.5 kgf·m, 69 ft·lb)



- Remove the drive pulley holder and install three drive pulley cover bolts to the specified torque.
- Adjust the installation length [A] of the drive pulley between the surface of the crankcase [B] and the collar [C] on the drive pulley as followings.

  Drive Pulley Installation Length [A]
  Standard: 164.85 ~ 165.95 mm (6.490 ~ 6.533 in.)



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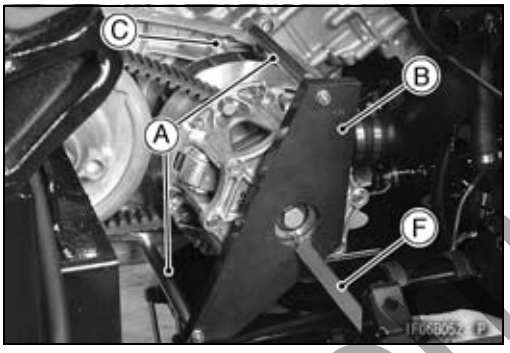
Drive Pulley



○Install the drive pulley measurement tool (legs (57001 -1712) [A] and plate [B]) on the crankcase [C].

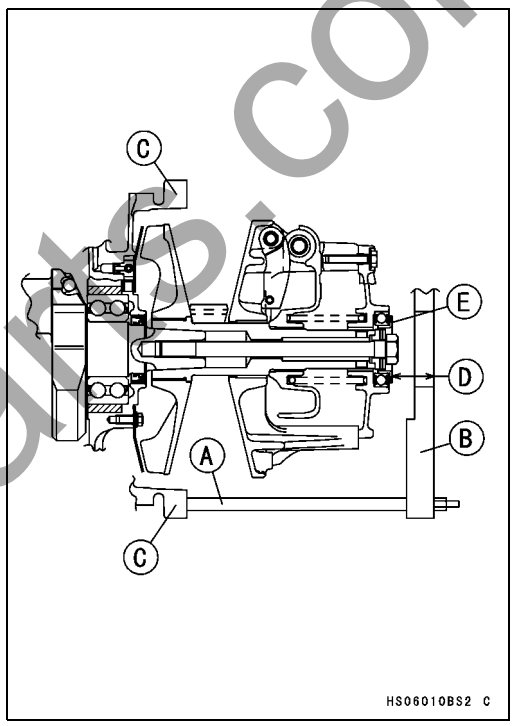
Special Tools - Drive Pulley Measurement Tool: 57001-1498
Leg: 57001-1712

○Measure the length [D] between the plate and collar [E] with vernier calipers [F] or a depth gauge.

Measurement Length [D]
Standard: 14.55 ~ 15.65 mm (0.573 ~ 0.616 in.)

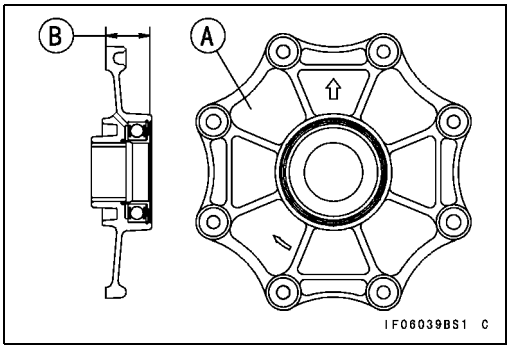
★If the measurement is not within the specified range, adjust it according to following table.

Status Quo		Replacement Part	
Measurement Length	Paint Color of Cover	Replace Part (Part Number)	Paint Color of Cover
less than 14.55 mm (0.573 in.)	Blue	Pulley Cover (14041-0037)	No Paint
	No Paint	Pulley Cover (14041-0035)	Red
	Red	Drive Pulley Assembly (49093-0029)	
more than 15.65 mm (0.616 in.)	Blue	Drive Pulley Assembly (49093-0029)	
	No Paint	Pulley Cover (14041-0036)	Blue
	Red	Pulley Cover (14041-0037)	No Paint



Drive Pulley Covers

Part Number	Paint Color [A]	Length [B]
14041-0035	Red	24.0 mm (0.945 in.)
14041-0036	Blue	25.4 mm (1.000 in.)
14041-0037	No Paint	24.7 mm (0.972 in.)



● Measure the length again, after the drive pulley cover is replaces.

★If the length is not within the specified length, replace the drive pulley assembly.

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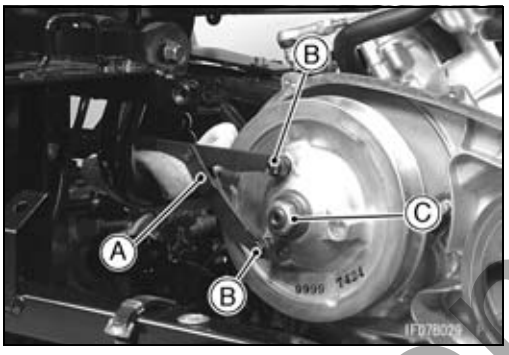
Driven Pulley

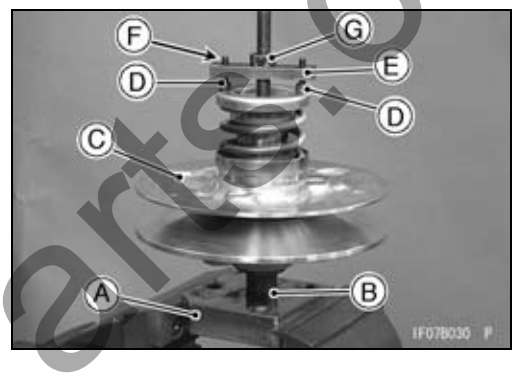
Driven Pulley Removal



- Remove:
  Torque Converter Cover (see Torque Converter Cover Removal)
  Drive Pulley (see Drive Pulley Removal)
  Drive Belt (see Drive Belt Removal)
- Using the flywheel & pulley holder [A] and attachments [B], remove the driven pulley nut [C] and washers. (Nut has R/H threads.)

  Special Tools - Flywheel & Pulley Holder: 57001-1605
  Pulley Holder Attachment: 57001-1472
- Remove:
  Driven Pulley

Driven Pulley Disassembly

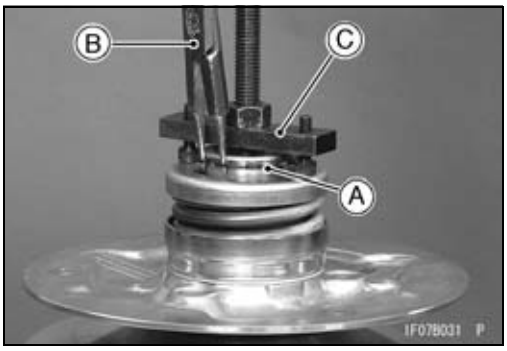


- Hold the drive & driven pulley holder [A] in a vise.

  Special Tool - Drive & Driven Pulley Holder: 57001-1473
- Screw the guide bar [B] into the holder.

  Special Tool - Spring Holder Set: 57001-1483
- Put the driven pulley [C] on the guide bar.
- Install the two bolts [D] so that the bolts protrude from the spring holder [E] about 7 mm (0.28 in.) [F].
- Tighten the nut [G], and compress the spring with the spring holder.

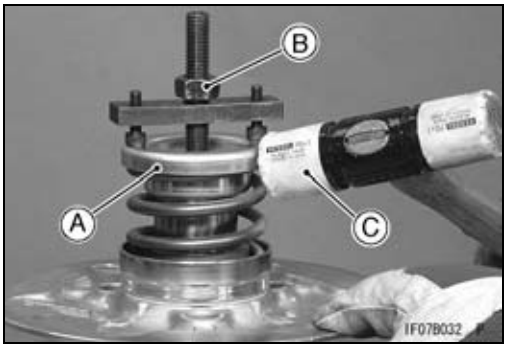
  Special Tool - Spring Holder Set: 57001-1483



- Remove the circlip [A] with circlip pliers [B].

  Special Tool - Outside Circlip Pliers: 57001-144
- Remove the nut and spring holder [C].

★The spring seat [A] may not lift even if the nut [B] loosens.
○Then tap the spring seat with a plastic mallet [C] lightly to release the stuck spring.



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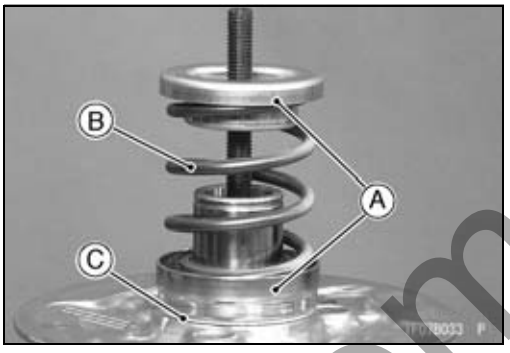
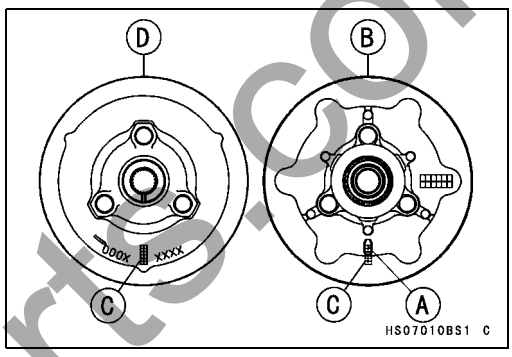
Driven Pulley

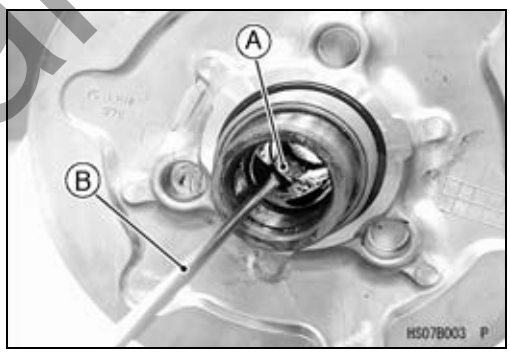
- Remove:
  Spring Seats [A]
  Spring [B]
  Thrust Plate [C]



- Confirm the paint mark “0” [A] on the movable sheave [B] in alignment with the point [C] on the fixed sheave [D] for phase fit of the sheaves.



- Wipe off the molybdenum disulfide grease.
- Remove the four pins [A] with a thin standard tip screwdriver [B].
- Remove the movable sheave from the fixed sheave.



- Remove:
  Spacer(s) [A] (for Drive Belt Deflection Adjustment)

Driven Pulley Inspection

★If the sheave surfaces [A] appear damaged, replace the sheaves.

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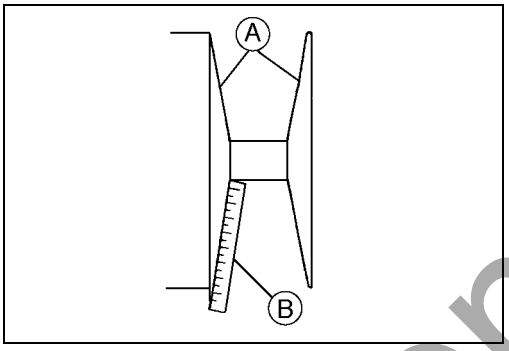
Driven Pulley

- Replace the sheave with uneven wear on the belt contacting surfaces.
  [A] Sheave Surface
  [B] Straight Edge



★If the sheave bushings [A] are damaged or worn, replace the movable sheave.

Sheave Bushing Inside Diameter
Standard: 40.000 ~ 40.039 mm (1.5748 ~ 1.5763 in.)
Service Limit: 40.07 mm (1.578 in.)

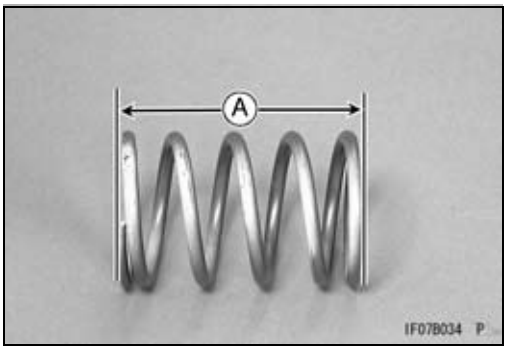
- Inspect seals for damage.

★If seals are damaged, replace the movable sheave.

★If the splines [A] are damaged or worn, replace the fixed sheave.

★If the spring is damaged or worn, replace the spring.

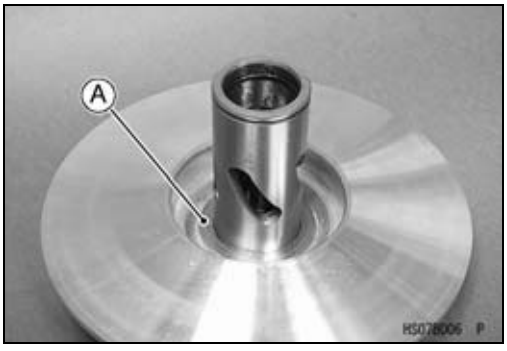
Spring Free Length [A]
Standard: 99 mm (3.9 in.)



★If the spring coils are distorted, replace the spring.

Driven Pulley Assembly

- Clean off any grease or dirt on the movable and fixed sheaves, and dry them with a clean cloth.
- Install:
  Spacers [A] (see Converter Drive Belt Deflection Adjustment in the Periodic Maintenance chapter)



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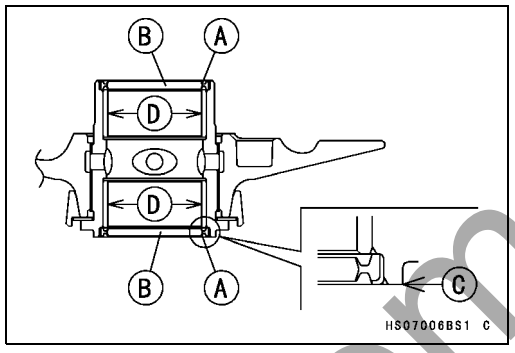
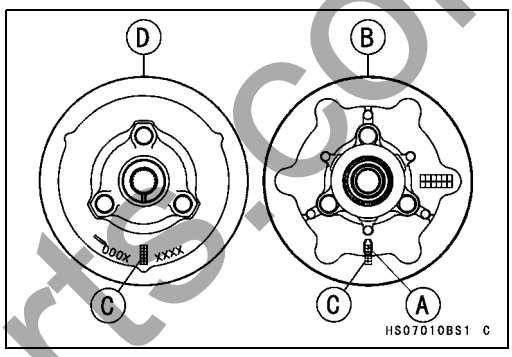
Driven Pulley

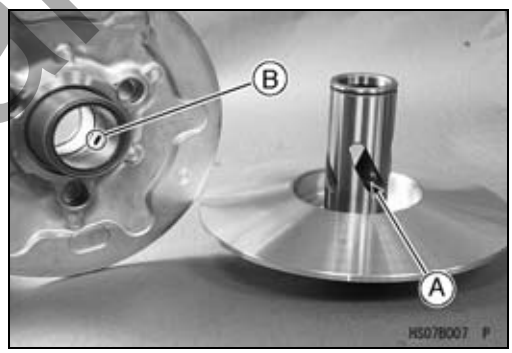
- Apply grease to the oil seal lips [A].
- Press the oil seals [B] in the movable sheave assembly so that the oil seal surface is flush [C] with the sleeve end.
- Apply [D] grease (WR500-No.2 (KYODO YUSHI), POWER LITE WR #2 (KYODO YUSHI), or SERAN-HV (TOTAL FINA)) to the inner surfaces of the busings.



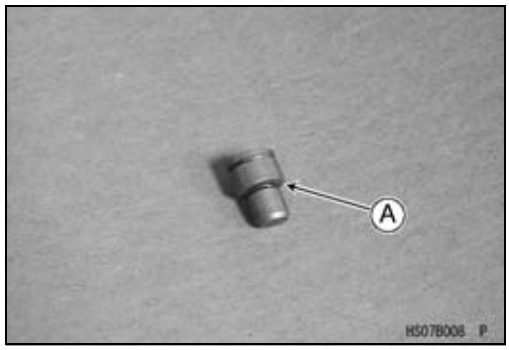
- Align the paint mark “0” [A] on the movable sheave [B] with the point [C] on the fixed sheave [D] for phase fit of the sheaves.



○In that case the opening [A] and hole [B] will be matched easily.



- Apply grease (WR500-No.2 (KYODO YUSHI), POWER LITE WR #2 (KYODO YUSHI), or SERAN-HV (TOTAL FINA)) to the seating surface [A] of the pins, and insert them into the holes in the movable sheave.

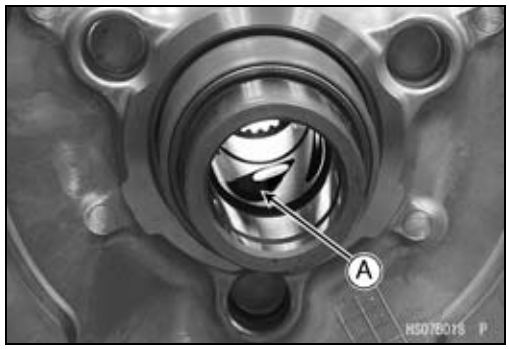


- Draw the movable sheave onto the fixed sheave, and apply grease of 1 g (0.035 oz) to all openings [A].

Grease - WR500-No.2 (KYODO YUSHI) or POWER LITE WR #2 (KYODO YUSHI) or SERAN-HV (TOTAL FINA)

NOTE

○*Do not heap up the grease out of the openings.*



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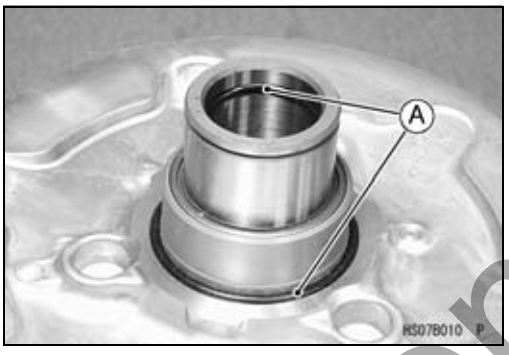
Driven Pulley

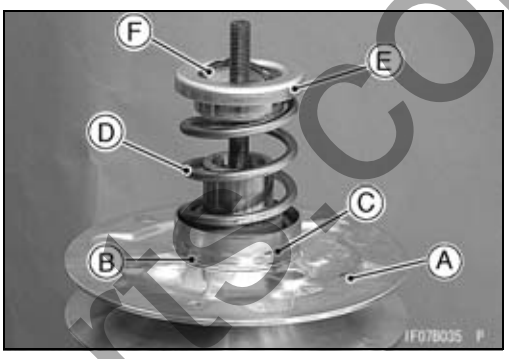
- Check that the O-rings [A] are in good condition.
★If any of the O-rings are damaged, replace them.
- Apply grease to the O-rings.



- Hold the drive & driven pulley holder in a vise.

  Special Tool - Drive & Driven Pulley Holder: 57001-1473
- Screw the guide bar into the holder.

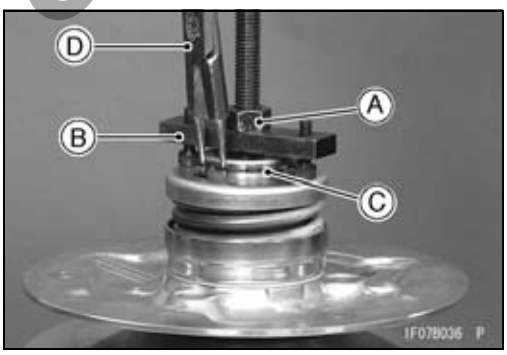
  Special Tool - Spring Holder Set: 57001-1483
- Put the driven pulley [A] onto the guide bar.
- Put the thrust plate [B] so that the alloy side (gray) faces the movable sheave.
- Install:
  Spring Seat [C]: 18.5 mm (0.728 in.)
  Spring [D]
  Spring Seat [E]: 23.3 mm (0.917 in.)
  Circlip [F]



- Tighten the nut [A], and compress the spring with the spring holder [B].

  Special Tool - Spring Holder Set: 57001-1483
- Install a new circlip [C] with circlip pliers [D].

  Special Tool - Outside Circlip Pliers: 57001-144
- Remove the driven pulley from the spring holder set.
- Clean the surface of the sheaves with an oil-less cleaning fluid.

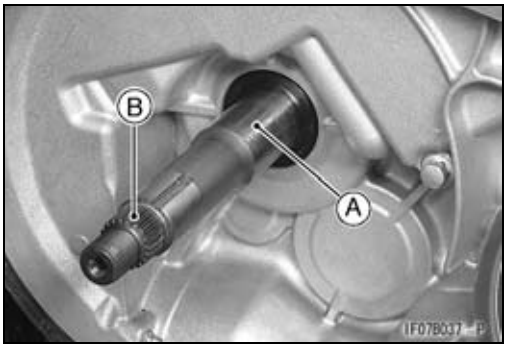


Driven Pulley Installation

- Clean the transmission driven shaft [A].
- Install:
  Driven Pulley

NOTE

○*When engaging the spline on the driven pulley with the spline [B] on the shaft, do not damage the pulley's spline. If any damage occurs, remove it with a file.*



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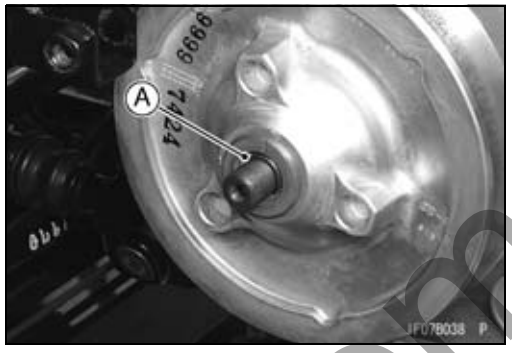
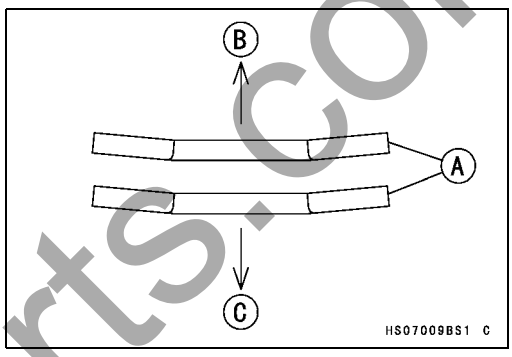
Driven Pulley

● Clean the threads of the driven shaft and driven pulley ends to open the air vent passage. Wipe off any extra grease.

○Wipe off any protruding grease [A].



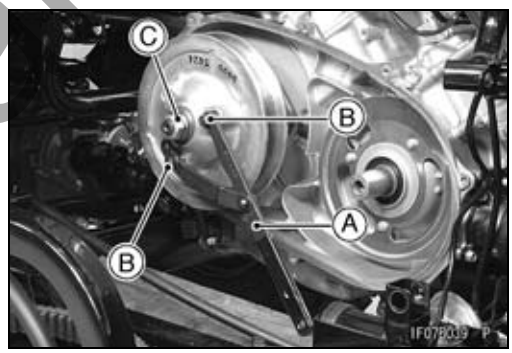
● Install two washers [A] on the shaft as shown.
Crankcase Side [B]
Bolt Head Side [C]



● Using the flywheel & pulley holder [A] and attachments [B], tighten the new driven pulley nut [C].

Special Tools - Flywheel & Pulley Holder: 57001-1605
Pulley Holder Attachment: 57001-1472

Torque - Driven Pulley Nut: 93 N·m (9.5 kgf·m, 69 ft·lb)



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Engine Lubrication System

Table of Contents

Exploded View 7-2
Specifications 7-4
Engine Oil Flow Chart 7-5
Special Tools and Sealant 7-6
Engine Oil and Oil Filter 7-7
  Oil Level Inspection 7-7
  Engine Oil Change 7-7
  Oil Filter Change 7-7
  Oil Screen Removal 7-8
  Oil Screen Cleaning 7-8
  Oil Pressure Measurement 7-8
Oil Pressure Relief Valve 7-10
  Oil Pressure Relief Valve Removal 7-10
  Oil Pressure Relief Valve Installation 7-10
  Oil Pressure Relief Valve Inspection 7-10
Oil Pump 7-11
  Oil Pump Removal 7-11
  Oil Pump Installation 7-11
Oil Pipe 7-13
  Oil Pipe Removal 7-13
  Oil Pipe Installation 7-14

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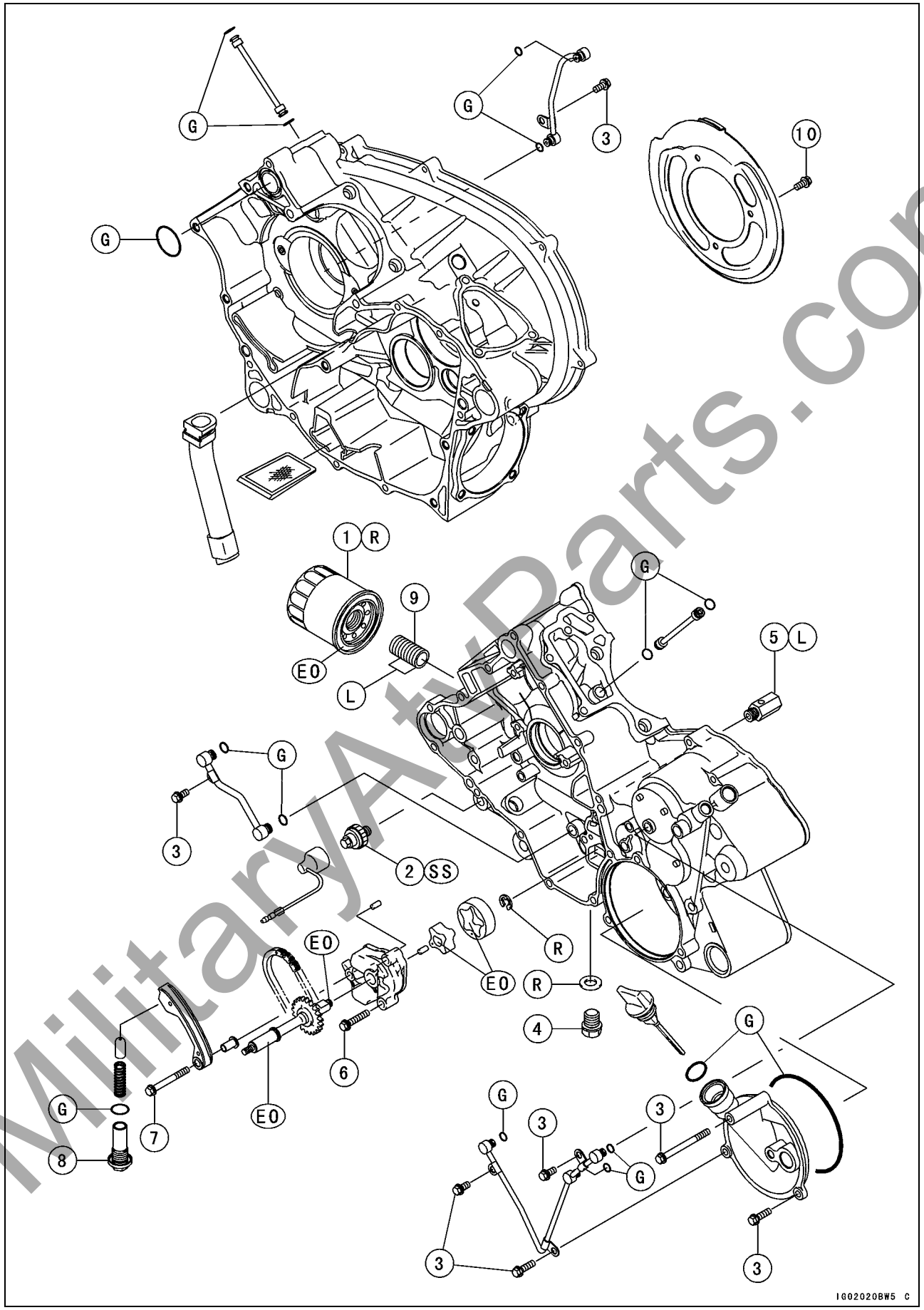
7-2 ENGINE LUBRICATION SYSTEM

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Oil Filter	17.5	1.8	13	R
2	Oil Pressure Switch	15	1.5	11	SS
3	Oil Pipe Bolts	8.8	0.90	78 in·lb	
4	Engine Oil Drain Plug	20	2.0	15	
5	Oil Pressure Relief Valve	15	1.5	11	L
6	Oil Pump Cover Bolts	8.8	0.90	78 in·lb	
7	Chain Guide Bolt	8.8	0.90	78 in·lb	
8	Oil Pump Drive Chain Tensioner Bolt	25	2.5	18	
9	Oil Filter Mounting Bolt	25	2.5	18	L (15 mm)
10	Plate Bolts	8.8	0.90	78 in·lb	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
SS: Apply silicone sealant (Liquid Gasket, TB1211: 56019-120).

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7-4 ENGINE LUBRICATION SYSTEM

Specifications

Item	Standard
Engine Oil	
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2
Viscosity	SAE 10W-40
Capacity	2.4 L (2.5 US qt) (when filter is not removed) 2.5 L (2.6 US qt) (when filter is removed) 2.6 L (2.7 US qt) (when engine is completely dry)
Oil Pressure Measurement	
Oil Pressure	515 kPa (5.3 kgf/cm², 74.7 psi) at 4 000 r/min (rpm), Oil Temperature 120°C (248°F)

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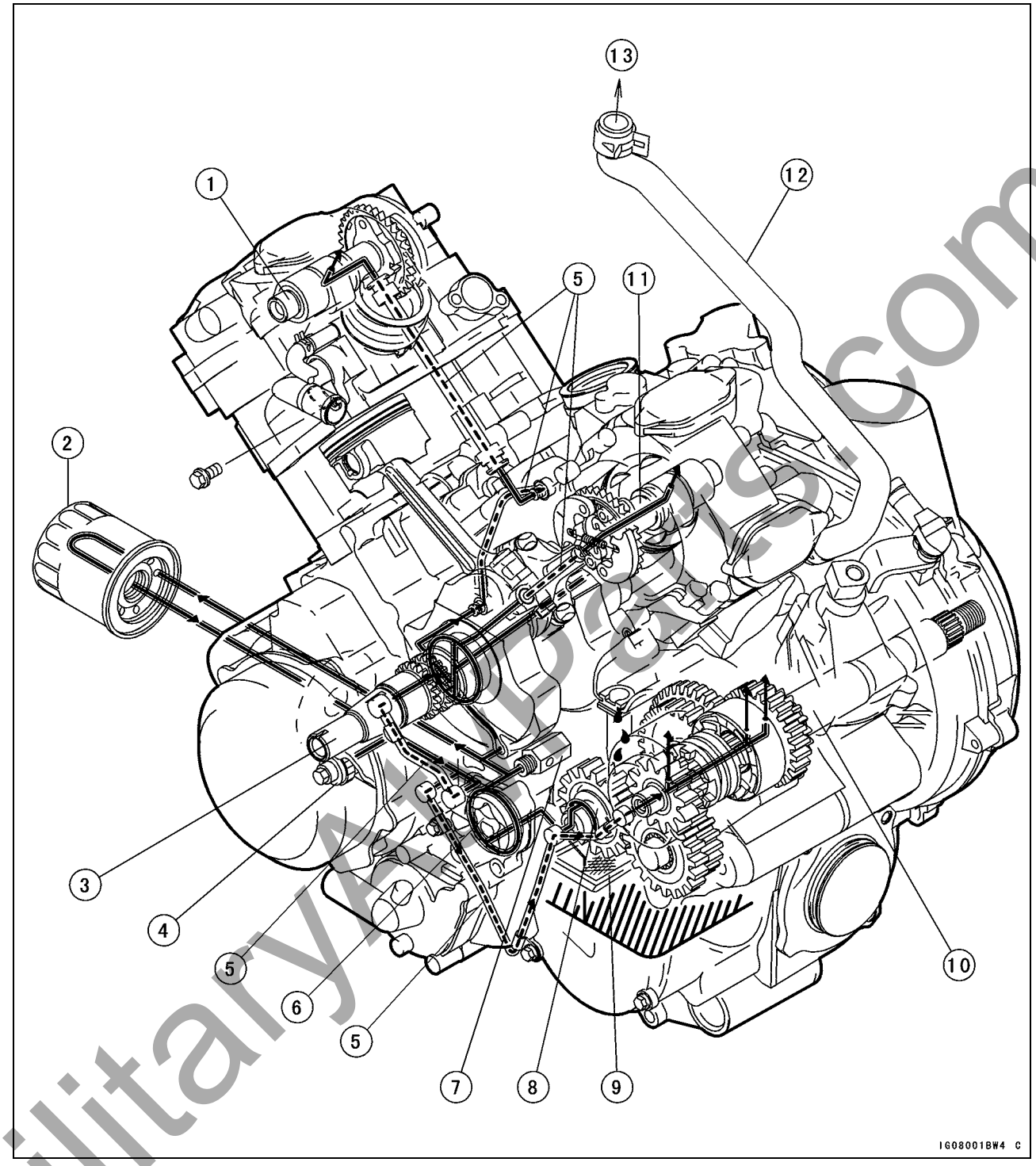
Engine Oil Flow Chart



1. Front Camshaft
2. Oil Filter
3. Crankshaft
4. Oil Pressure Switch
5. Oil Pipes
6. Oil Pump
7. Relief Valve
8. Transmission Idle Shaft
9. Oil Screen
10. Transmission Driven Shaft
11. Rear Camshaft
12. Breather Hose
13. To Air Cleaner

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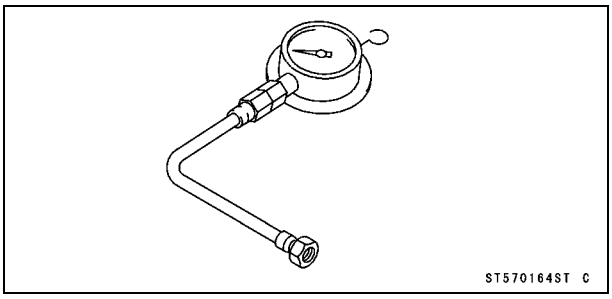
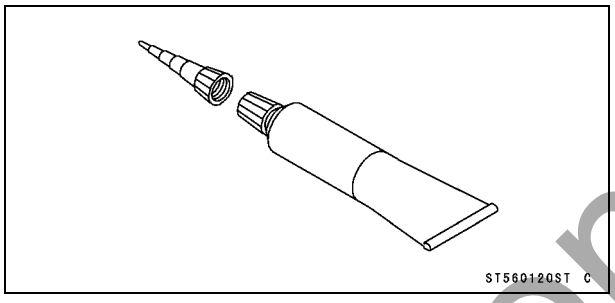
7-6 ENGINE LUBRICATION SYSTEM

Special Tools and Sealant

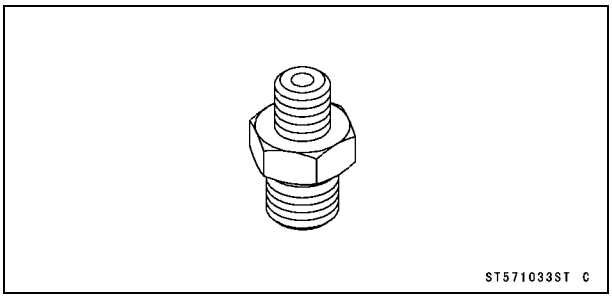
Oil Pressure Gauge, 10 kgf/cm²:
57001-164



Liquid Gasket, TB1211:
56019-120



Oil Pressure Gauge Adapter, PT 1/8:
57001-1033



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Engine Oil and Oil Filter

⚠ WARNING

Vehicle operation with insufficient, deteriorated, or contaminated engine oil will cause accelerated wear and may result in engine seizure, accident, and injury. Check the oil level before each use and change the oil and filter according to the periodic maintenance chart.

Oil Level Inspection

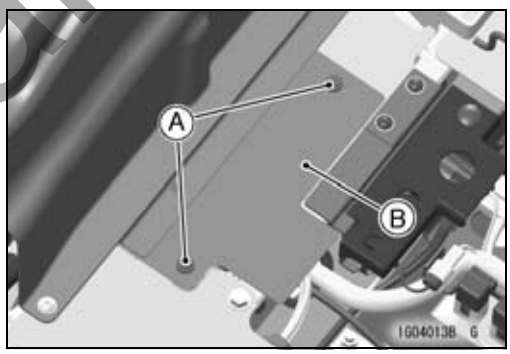
- Park the vehicle so that it is level, both side-to-side and front-to-rear.

★If the oil has just been changed, start the engine, and run it for several minutes to fill the oil filter.

NOTICE

Allow the engine to idle for several minutes so that oil may reach all parts of the engine. Racing a "dry" engine may cause severe damage.

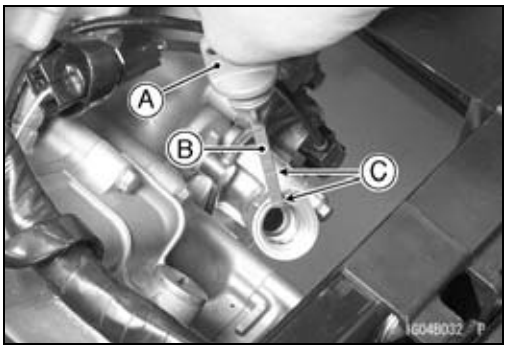
- Stop the engine and wait several minutes for all the oil to drain back to the sump.
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Quick Rivets [A]
  Heat Guard Plate [B]



- Unscrew the oil filler cap [A], wipe its dipstick [B] dry, and tighten it into the filler opening.
- Unscrew the oil filler cap and check the oil level. The oil level should be between the upper (H) and lower (L) level lines [C].

★If the level is too high, suck the excess oil out the filler hole with a syringe or other suitable device.

★If the level is too low, add oil through the filler hole. Use the same type and make of oil that is already in the engine.



Engine Oil Change

- Refer to the Engine Oil Change in the Periodic Maintenance chapter.

Oil Filter Change

- Refer to the Oil Filter Change in the Periodic Maintenance chapter.

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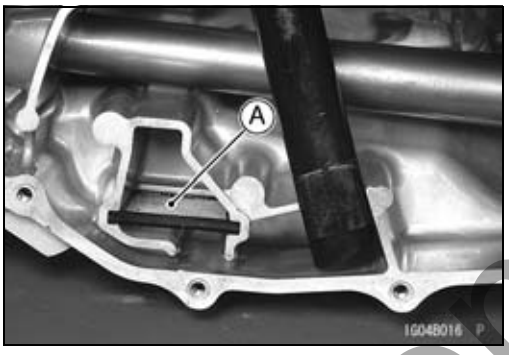
Engine Oil and Oil Filter

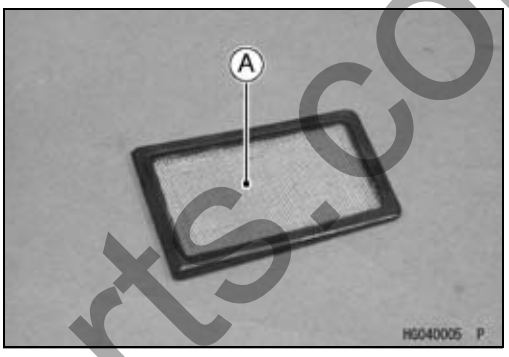
Oil Screen Removal

- Split the crankcase (see Crankcase Disassembly in the Crankshaft/Transmission chapter).
- Pull the oil screen [A] out of the crankcase.



Oil Screen Cleaning

- Clean the oil screen [A] thoroughly whenever it is removed for any reason.
- Clean the oil screen with a high-flash point solvent and remove any particles stuck to it.



⚠ WARNING

Gasoline and low-flash point solvents can be flammable and/or explosive and cause severe burns. Clean the screen in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low-flash point solvent to clean the screen.

NOTE

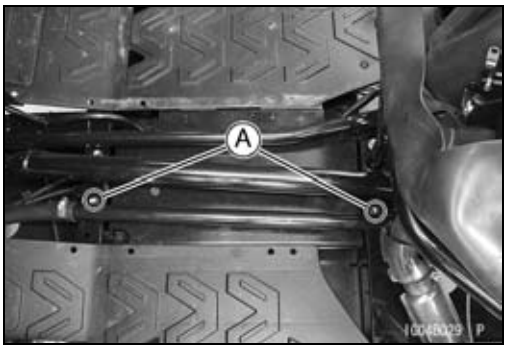
○*While cleaning the screen, check for any metal particles that might indicate internal engine damage.*

- Check the screen carefully for any damage, holes, broken wires, or gasket pulling off.

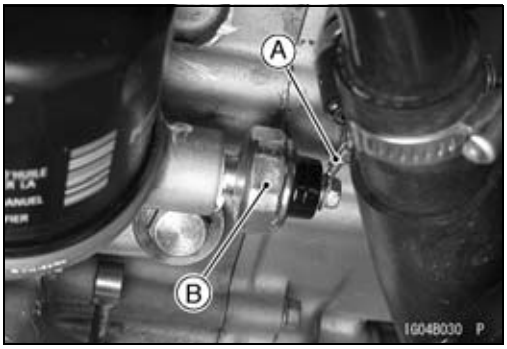
★If the screen is damaged, replace it.

Oil Pressure Measurement

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Engine Bottom Guard (see Engine Bottom Guard Removal in the Frame chapter)
  Water Pipe Bolts [A]



- Remove:
  Oil Pressure Switch Lead [A] (disconnect)
  Oil Pressure Switch [B]



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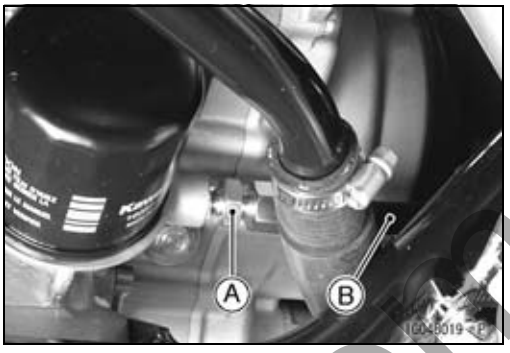
Engine Oil and Oil Filter

- Attach the oil pressure gauge adapter [A] and gauge hose [B] to the engine.

Special Tools - Oil Pressure Gauge, 10 kgf/cm²: 57001-164
Oil Pressure Gauge Adapter, PT 1/8: 57001 -1033



- Start the engine and warm up the engine.
- Run the engine at the specified speed, and read the oil pressure gauge [A].

Oil Pressure
Standard: 515 kPa (5.3 kgf/cm², 74.7 psi) @4 000 r/min (rpm), Oil Temperature 120°C (248°F)

★If the oil pressure is much lower than the standard, inspect the relief valve, oil pump, and/or crankshaft bearing insert wear.
★If the oil pressure is much higher than the standard, inspect the oil filter, oil screen, and other areas of the lubrication system for clogging.
- Stop the engine.
- Remove the oil pressure gauge and adapter.

⚠ WARNING

Hot oil can cause severe burns. Beware of hot engine oil that will drain through the oil passage when the gauge adapter is removed.

- Apply silicone sealant to the oil pressure switch, and tighten it.

Sealant - Liquid Gasket, TB1211: 56019-120

Torque - Oil Pressure Switch: 15 N·m (1.5 kgf·m, 11 ft·lb)

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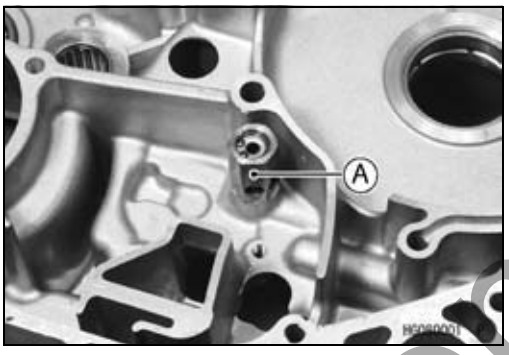
Oil Pressure Relief Valve

Oil Pressure Relief Valve Removal



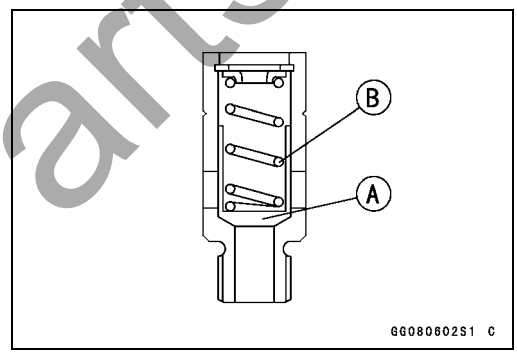
- Split the crankcase (see Crankcase Disassembly in the Crankshaft/Transmission chapter).
- Remove the oil pressure relief valve [A].

Oil Pressure Relief Valve Installation

- See crankcase assembly (see Crankcase Assembly in the Crankshaft/Transmission chapter).
- Apply a non-permanent locking agent to the threads of oil pressure relief valve, and tighten it.

Torque - Oil Pressure Relief Valve: 15 N·m (1.5 kgf·m, 11 ft·lb)

Oil Pressure Relief Valve Inspection



- Remove the relief valve.
- Using a wooden stick, push the inner valve to make sure that the valve [A] moves smoothly and that it returns to its original position by the force of the spring [B].

NOTE

○*The relief valve cannot be disassembled and it must be inspected in the assembled state.*

★If the valve movement is not smooth, wash the relief valve with high-flash point solvent, and use compressed air to remove any foreign particles from it.

⚠ WARNING

Gasoline and low-flash point solvents can be flammable and/or explosive and cause severe burns. Clean the oil pressure relief valve in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or a low-flash point solvent to clean the oil pressure relief valve.

★If the valve does not move smoothly even after washing it, replace the relief valve. The oil pressure relief valve is precision made with no allowance for replacement of individual parts.

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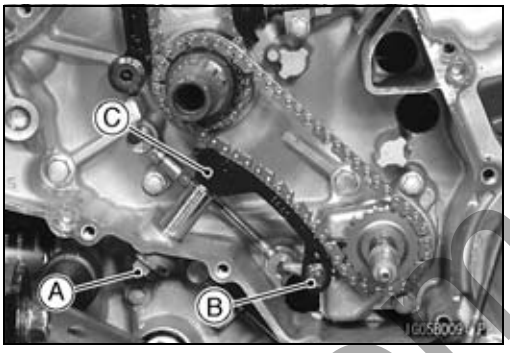
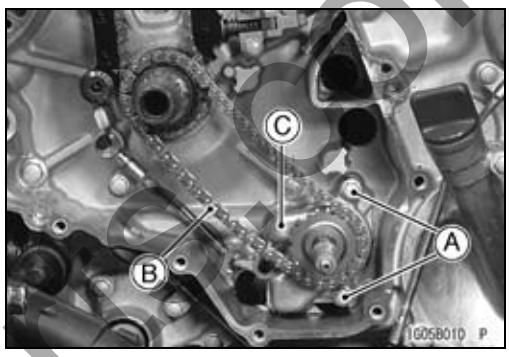
Oil Pump

Oil Pump Removal

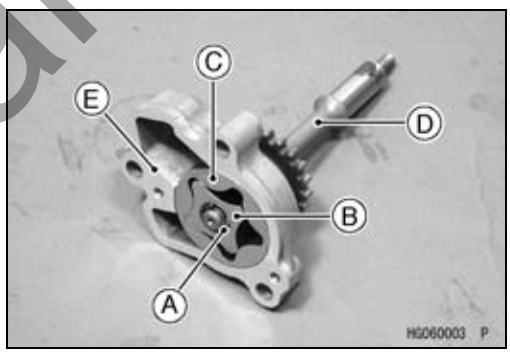
● Remove:
Alternator Rotor and Starter Clutch Gear (see Alternator Rotor Removal in the Electrical System chapter)
Oil Pump Drive Chain Tensioner Bolt [A]
Chain Guide Bolt [B] and Collar
Chain Guide [C]



● Remove:
Oil Pump Bolts [A]
Oil Pump Drive Chain [B] and Oil Pump Assembly [C]



● Remove:
Circlip [A]
Inner Rotor [B]
Outer Rotor [C]
Oil Pump Drive Shaft [D]
Oil Pump Cover [E]



Oil Pump Installation

● Apply engine oil:
Oil Pump Drive Shaft
Inner and Outer Rotors
● Install:
Oil Pump Drive Shaft
Oil Pump Cover
Inner Rotor
Outer Rotor
New Circlip

● Check to see that the dowel pins [A] are in place.
● Apply engine oil in the oil pump housing.

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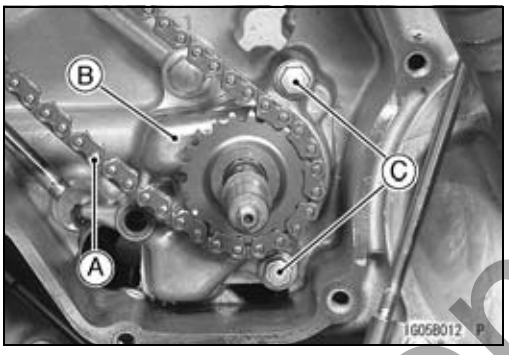
Oil Pump

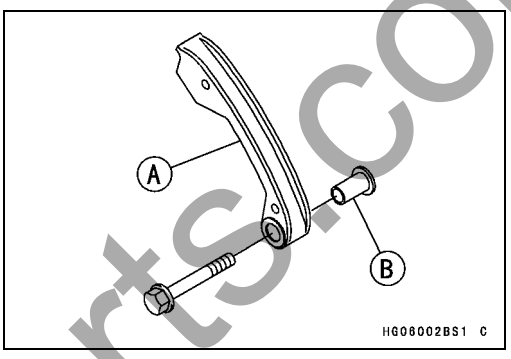
- Install the oil pump drive chain [A] with the oil pump assembly [B].
- Tighten:

Torque - Oil Pump Cover Bolts [C]: 8.8 N·m (0.90 kgf·m, 78 in·lb)



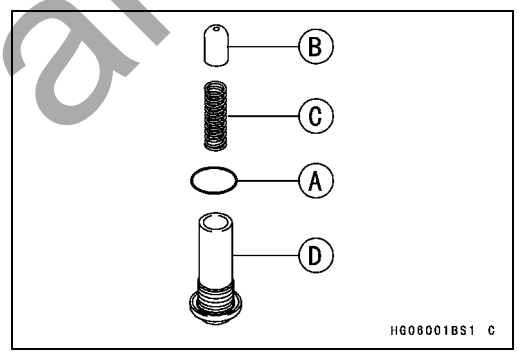
- Install:
  Chain Guide [A] and Collar [B]
- Tighten:

Torque - Chain Guide Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



- Apply grease to the O-ring [A].
- Install:
  Pin [B]
  Spring [C]
  O-ring
  Oil Pump Drive Chain Tensioner Bolt [D]
- Tighten:

Torque - Oil Pump Drive Chain Tensioner Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)



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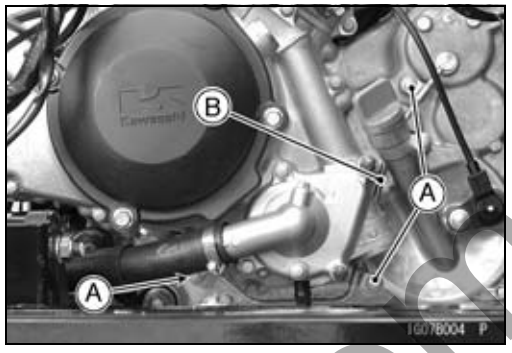
Oil Pipe

Oil Pipe Removal

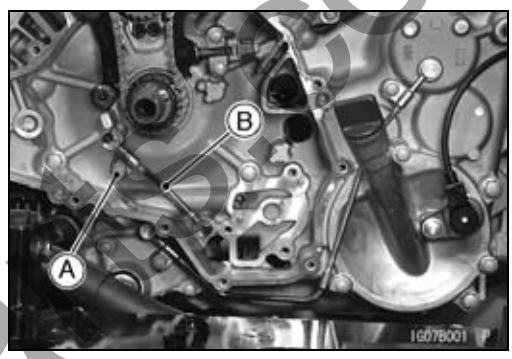
Engine Left Side Oil Pipe (Engine Outside)

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Left Cover (see Left Cover Removal in the Frame chapter)
  Engine Bottom Guard (see Engine Bottom Guard Removal in the Frame chapter)
  Oil Pipe Bolts [A]
  Oil Pipe [B]



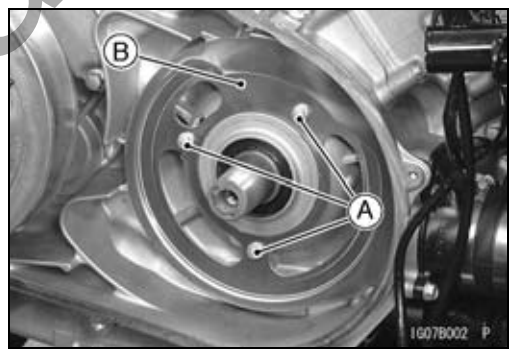
Engine Left Side Oil Pipe (Engine Inside)

- Remove:
  Alternator Cover (see Alternator Cover Removal in the Electrical System chapter)
  Oil Pump (see Oil Pump Removal)
  Oil Pipe Bolts [A]
  Oil Pipe [B]

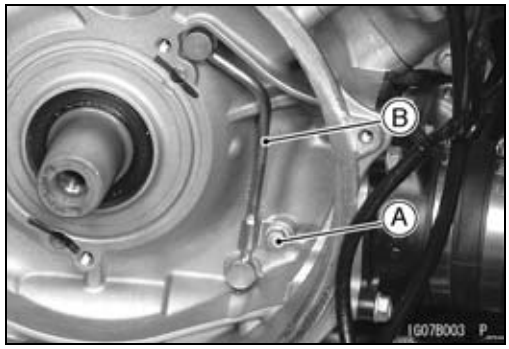


Engine Right Side Oil Pipe

- Remove:
  Drive Pulley (see Drive Pulley Removal in the Converter System chapter)
  Plate Bolts [A]
  Plate [B]



- Remove:
  Oil Pipe Bolt [A]
  Oil Pipe [B]



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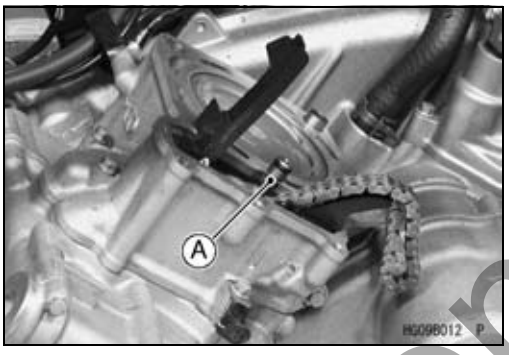
Oil Pipe

Engine Inside Oil Pipe

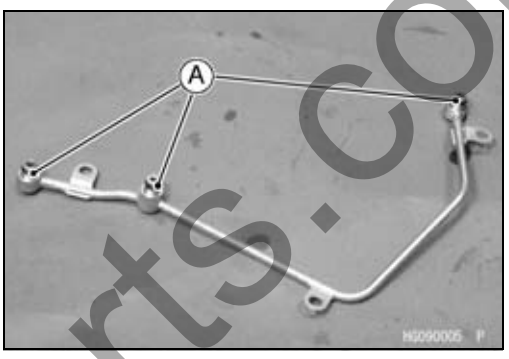
- Remove:
  Cylinder Head (see Cylinder Head Removal in the Engine Top End chapter)
  Oil Pipe [A]



Oil Pipe Installation

- Replace the O-rings [A] with new ones if they are damaged.
- Apply engine oil to the O-rings before installation.
- Tighten:

Torque - Oil Pipe Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



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Engine Removal/Installation

Table of Contents

Exploded View 8-2
Engine Removal/Installation 8-4
Engine Removal 8-4
Engine Installation 8-6

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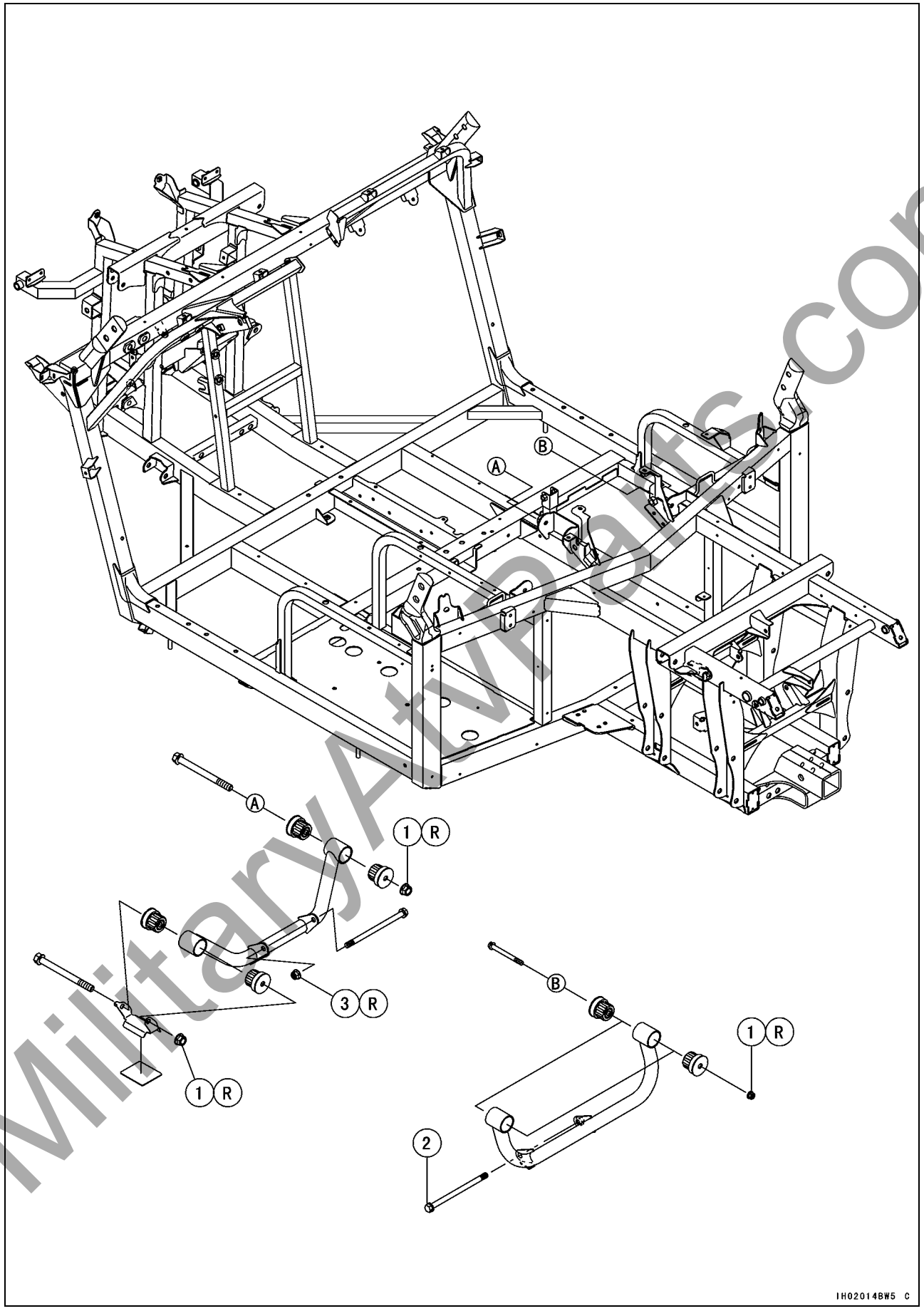
8-2 ENGINE REMOVAL/INSTALLATION

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Engine Bracket Pipe Mounting Nuts	41.5	4.2	31	R
2	Engine Mounting Bolt	60.1	6.1	44	
3	Engine Mounting Nut	60.1	6.1	44	R

R: Replacement Parts

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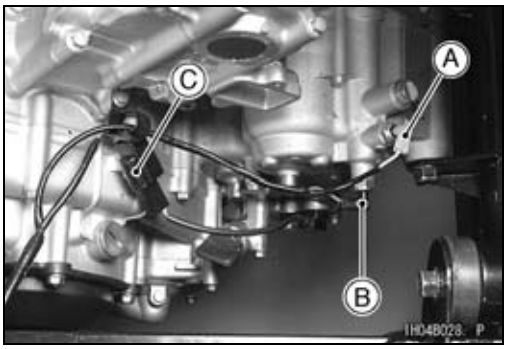
Engine Removal/Installation

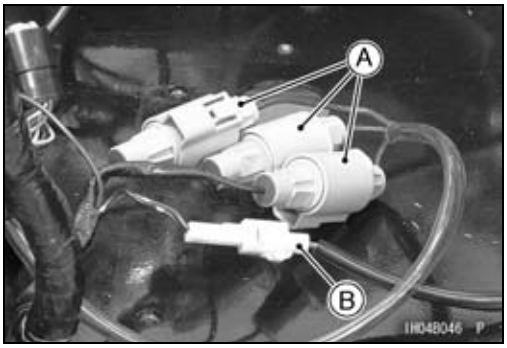
Engine Removal

- Drain:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
- Remove:
  Bars (If required) (see Bars Removal in the Frame chapter)
  Air Cleaner Housing and Duct (see Air Cleaner Housing and Duct Removal in the Fuel System chapter)
  Throttle Body Assy (see Throttle Body Assy Removal in the Fuel System (DFI) chapter)
  Right Frame Pipe (see Right Frame Pipe Removal in the Frame chapter)
  Shift Lever (see Shift Lever Removal in the Crankshaft/Transmission chapter)
  Center Bracket (see Center Bracket Removal in the Frame chapter)
  Muffler and Exhaust Pipe (see Muffler and Exhaust Pipe Removal in the Engine Top End chapter)
  Front Propeller Shaft (see Front Propeller Shaft Removal in the Final Drive chapter)
  Rear Propeller Shaft (see Rear Propeller Shaft Removal in the Final Drive chapter)
  Torque Converter Outlet Duct (see Torque Converter Cover Removal in the Converter System chapter)

- Remove:
  Neutral Switch Lead Connector [A]
  Reverse Switch Lead Connector [B]
  Forward/Reverse Detecting Sensor Lead Connector [C]



- Remove:
  Alternator Lead Connectors [A]
  Crankshaft Sensor Lead Connector [B]



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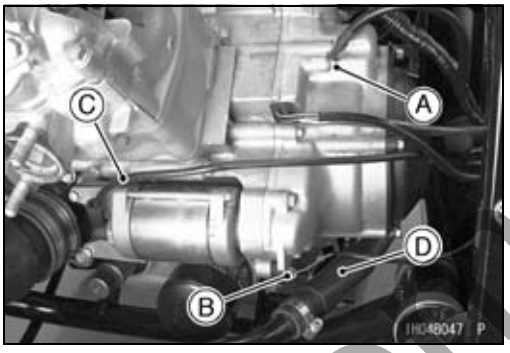
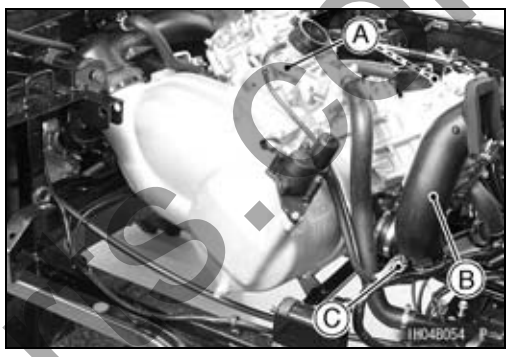
Engine Removal/Installation

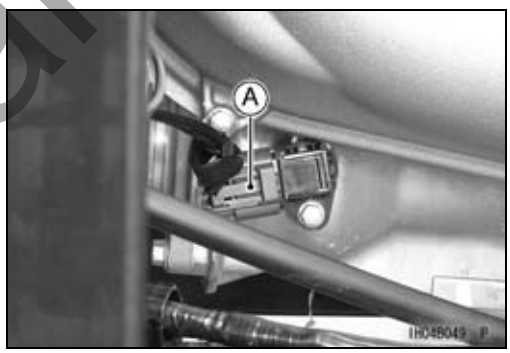
● Remove:
Engine Ground Lead Terminal [A]
Oil Pressure Switch Lead Connector [B]
Starter Motor Cable [C]
Water Hose [D]



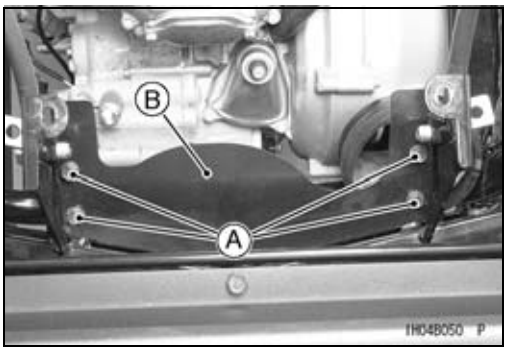
● Remove:
Water Pipes [A] and Thermostat Housing
Torque Converter Inlet Duct [B]
Engine Brake Actuator Lead Connector [C]



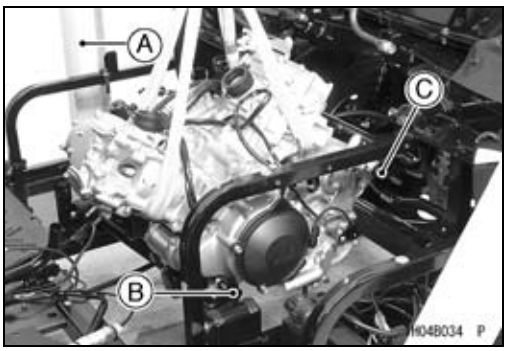
● Remove:
Speed Sensor Connector [A]



● Remove:
Bolts [A]
Plate [B]



● Hold the engine with a lifter [A].
● Remove:
Engine Mounting Bolt and Nut [B]
Engine Mounting Bolt [C]



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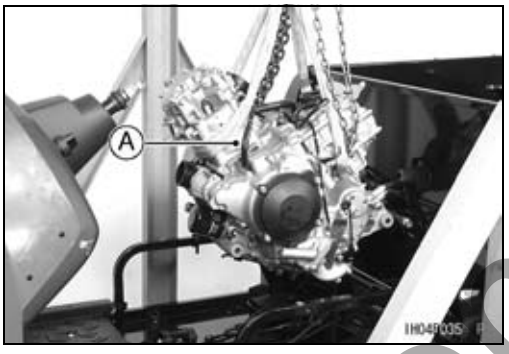
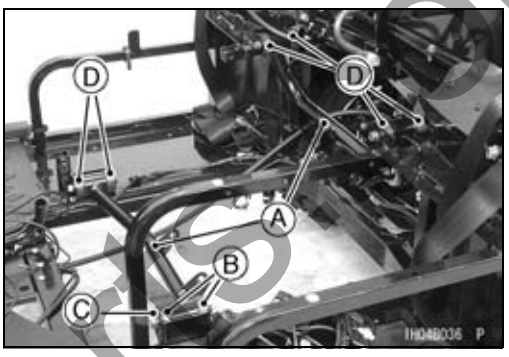
Engine Removal/Installation

● Remove:
Engine [A]



Engine Installation

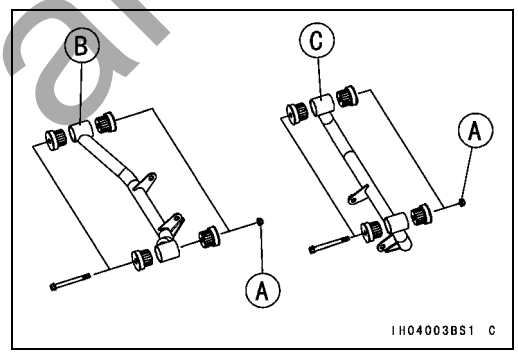
● When installing the engine bracket pipes [A], note the following.
● Install the red painted dampers [B] (part number stamped: 92161-0571) and cover [C] at the front left position.
○Touch the projection of the cover to the bracket of front side.
● Install:
No Painted Dampers [D]



● Replace the engine bracket pipe mounting nuts [A] with new ones.
● Tighten:

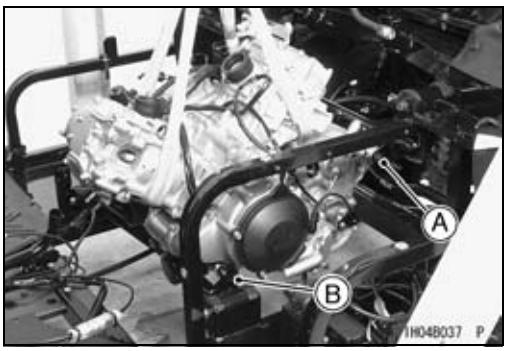
Torque - Engine Bracket Pipe Mounting Nuts [A]: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

Front Engine Bracket Pipe [B]
Rear Engine Bracket Pipe [C]



● Install:
Engine
Rear Engine Mounting Bolt [A]
Front Engine Mounting Bolt and Nut [B]
○Insert the front engine mounting bolt from right side.
● Tighten:

Torque - Engine Mounting Bolt and Nut : 60.1 N·m (6.1 kgf·m, 44 ft·lb)



● Install the removed parts.
● Adjust:
Throttle Cable (see Throttle Pedal Free Play Adjustment in the Periodic Maintenance chapter)
Differential Control Cable (see Differential Control Lever Free Play Adjustment in the Periodic Maintenance chapter)

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Crankshaft/Transmission

Table of Contents

Exploded View 9-2
Specifications 9-6
Special Tools and Sealant 9-8
Crankcase 9-9
  Crankcase Disassembly 9-9
  Crankcase Assembly 9-9
Crankshaft/Connection Rod 9-13
  Crankshaft Removal 9-13
  Crankshaft Installation 9-13
  Connecting Rod Removal 9-13
  Connecting Rod Installation 9-13
  Crankshaft/Connecting Rod Cleaning 9-14
  Connecting Rod Bend Inspection 9-14
  Connecting Rod Twist Inspection 9-14
  Connecting Rod Big End Side Clearance Inspection 9-15
  Connecting Rod Big End Bearing/Crankpin Wear Inspection 9-15
  Crankshaft Runout Inspection 9-17
  Crankshaft Main Bearing/Journal Wear Inspection 9-17
Transmission 9-18
  Shift Lever Removal 9-18
  Shift Lever Installation 9-19
  Transmission Removal 9-23
  Transmission Installation 9-24
  Shift Fork Bending Inspection 9-26
  Shift Fork/Gear and Shifter Groove Wear Inspection 9-26
  Transmission and Shift Mechanism Inspection 9-27
Ball Bearing, Needle Bearing, and Oil Seal 9-29
  Ball and Needle Bearing Replacement 9-29
  Ball and Needle Bearing Wear Inspection 9-29
  Oil Seal Inspection 9-29

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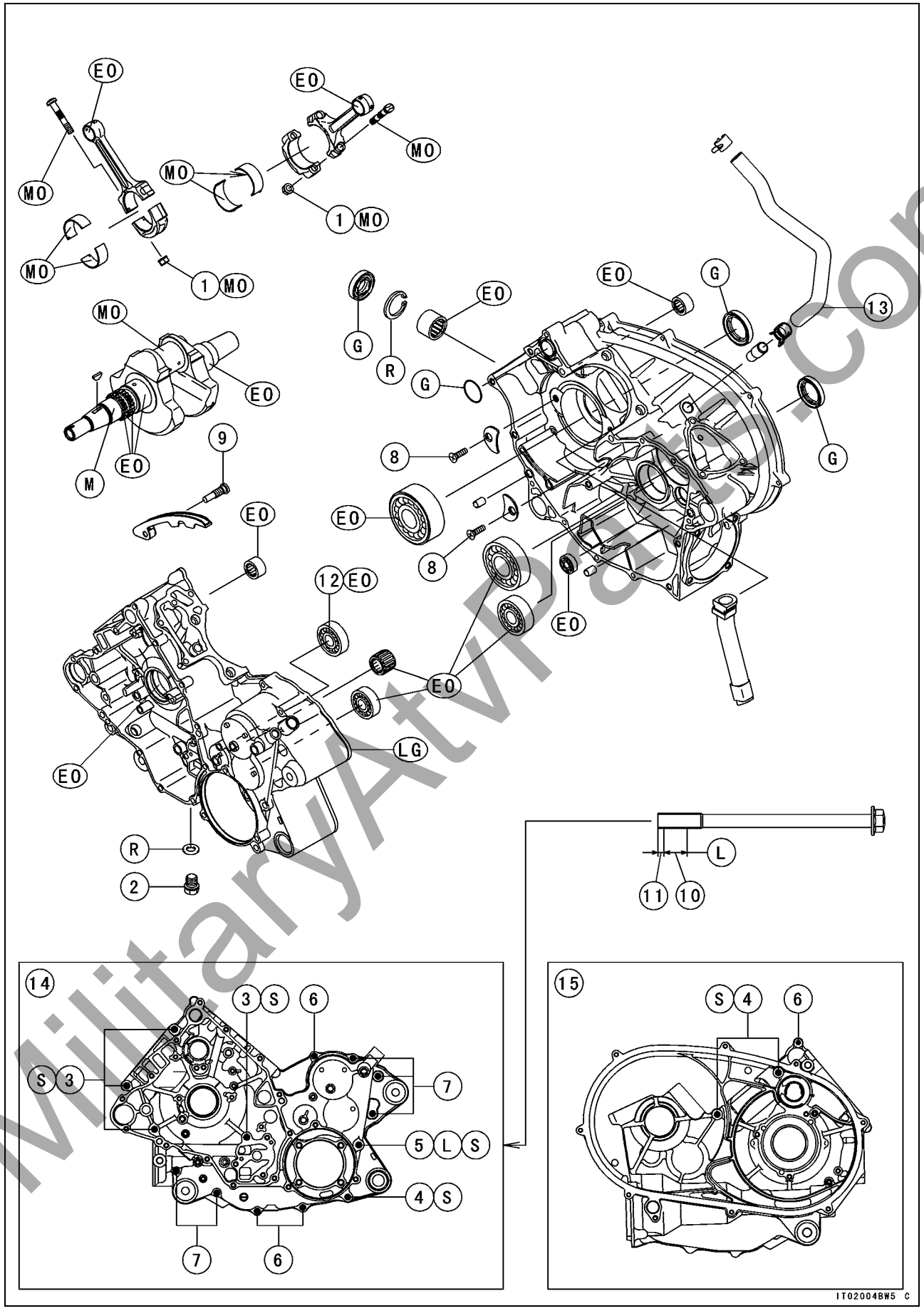
9-2 CRANKSHAFT/TRANSMISSION

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Connecting Rod Big End Cap Nuts	34.3	3.5	25	MO
2	Engine Oil Drain Plug	20	2.0	15	
3	Crankcase Bolts (M8), L = 75 mm (2.95 in.)	20	2.0	15	S
4	Crankcase Bolts (M8), L = 110 mm (4.33 in.)	20	2.0	15	S
5	Crankcase Bolt (M8), L = 110 mm (4.33 in.)	20	2.0	15	S, L (1)
6	Crankcase Bolts (M6), L = 40 mm (1.57 in.)	9.8	1.0	87 in·lb	
7	Crankcase Bolts (M6), L = 65 mm (2.56 in.)	9.8	1.0	87 in·lb	
8	Bearing Position Plate Screws	4.9	0.50	43 in·lb	
9	Rear Cylinder Camshaft Chain Guide Bolt	20	2.0	15	

10. About 12 mm (0.47 in.)
11. Do not apply a non-permanent locking agent to this area (2 ~ 3 mm, 0.08 ~ 0.12 in.)
12. Face the seal of the bearing to the left side (outward).
13. White Mark: Align the white mark with the crankcase mark.
14. Left Crankcase
15. Right Crankcase

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket (Liquid Gasket, TB1216: 92104-1063).
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution (mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1).
R: Replacement Parts
S: Follow the specific tightening sequence.

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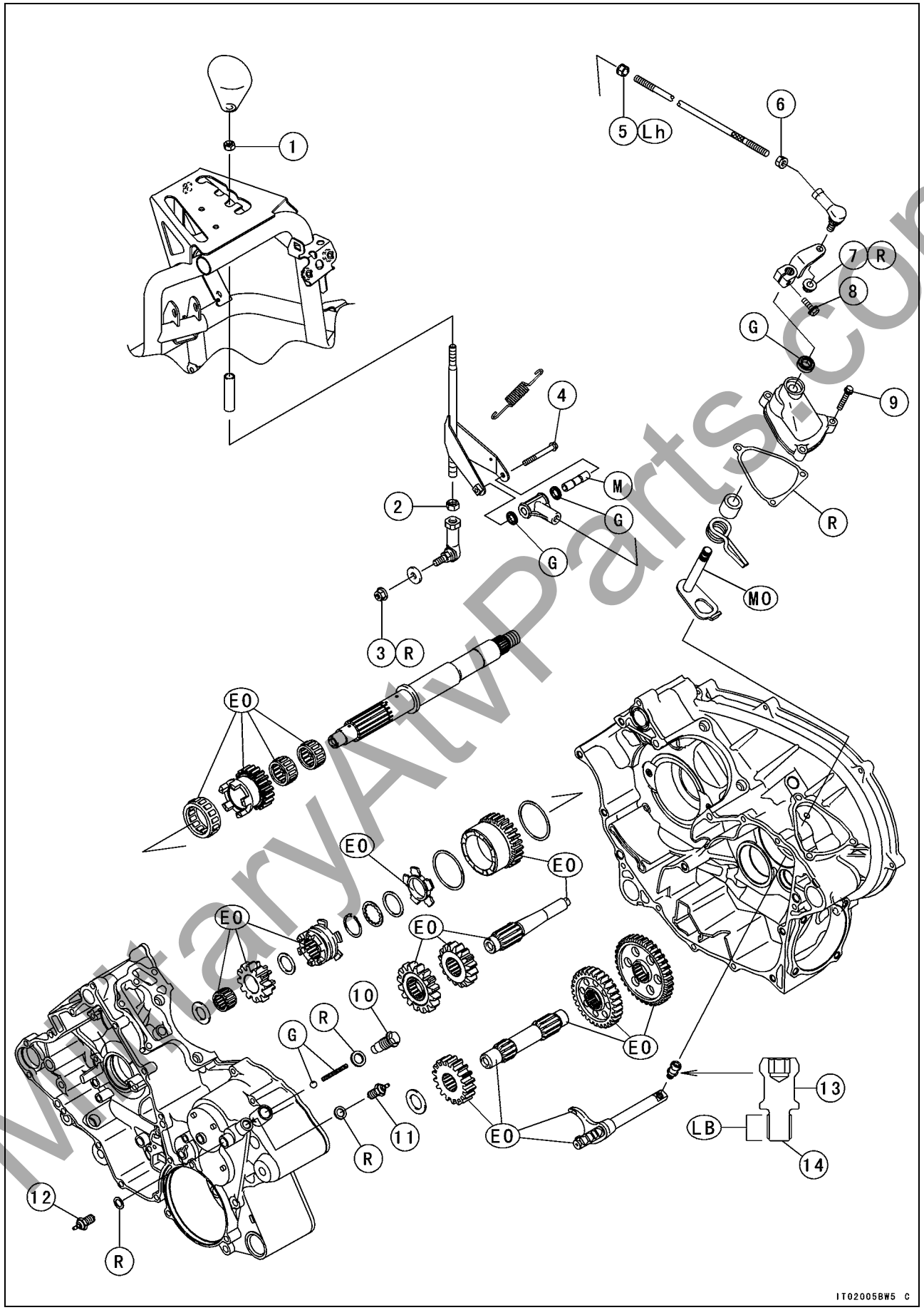
9-4 CRANKSHAFT/TRANSMISSION

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Grip Hold Nut	9.8	1.0	87 in·lb	
2	Tie-rod End Locknut	19.6	2.0	14	
3	Shift Lever Assembly Nut	19.6	2.0	14	R
4	Tie-rod End Bolt	9.8	1.0	87 in·lb	
5	Tie-rod End Front Locknut	9.8	1.0	87 in·lb	Lh
6	Tie-rod End Rear Locknut	9.8	1.0	87 in·lb	
7	Tie-rod End Nut	19.6	2.0	14	R
8	Shift Shaft Lever Bolt	13.5	1.4	10	
9	Shift Shaft Cover Bolts	8.8	0.90	78 in·lb	
10	Shift Shaft Positioning Bolt	25	2.5	18	
11	Neutral Position Switch	15	1.5	11	
12	Reverse Position Switch	15	1.5	11	
13	Shift Shaft Spring Bolt	25	2.5	18	LB

14. Do not apply a non-permanent locking agent to this end.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LB: Apply a non-permanent locking agent (Three Bond TB2471, Blue).
Lh: Left-hand Threads
M: Apply molybdenum disulfide grease.
MO: Apply molybdenum disulfide oil solution (mixture of the engine oil and molybdenum disulfide grease in a weight ratio 10:1).
R: Replacement Parts

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Specifications

Item	Standard	Service Limit
Crankshaft, Connecting Rods		
Connecting Rod Bend	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Twist	– – –	TIR 0.2/100 mm (0.008/3.94 in.)
Connecting Rod Big End Side Clearance	0.16 ~ 0.46 mm (0.0063 ~ 0.0181 in.)	0.7 mm (0.028 in.)
Connecting Rod Big End Bearing Insert/Crankpin Clearance	0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in.)	0.09 mm (0.0035 in.)
Crankpin Diameter:	39.984 ~ 40.000 mm (1.5742 ~ 1.5748 in.)	39.97 mm (1.5736 in.)
Marking:		
None	39.984 ~ 39.992 mm (1.5742 ~ 1.57449 in.)	– – –
○	39.993 ~ 40.000 mm (1.57452 ~ 1.5748 in.)	– – –
Connecting Rod Big End Inside Diameter:	43.000 ~ 43.016 mm (1.6929 ~ 1.6935 in.)	– – –
Marking:		
None	43.000 ~ 43.008 mm (1.6929 ~ 1.69322 in.)	– – –
○	43.009 ~ 43.016 mm (1.69326 ~ 1.6935 in.)	– – –
Connecting Rod Big End Bearing Insert Thickness:		
Brown	1.482 ~ 1.486 mm (0.05835 ~ 0.05850 in.)	– – –
Yellow	1.486 ~ 1.490 mm (0.05850 ~ 0.05866 in.)	– – –
Green	1.490 ~ 1.494 mm (0.05866 ~ 0.05882 in.)	– – –

Connecting Rod Big End Bearing Insert Selection:

Con-rod Big End Bore Diameter Marking	Crankpin Diameter Marking	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1963
None	None	Yellow	92028-1962
○	○		
○	None	Green	92028-1961

Crankshaft Runout	TIR 0.04 mm (0.0016 in.) or less	TIR 0.10 mm (0.0039 in.)
Crankshaft Main Journal Diameter	41.984 ~ 42.000 mm (1.6529 ~ 1.6535 in.)	41.96 mm (1.6520 in.)
Crankshaft Main Bearing Bore Diameter	42.025 ~ 42.041 mm (1.6545 ~ 1.6552 in.)	42.07 mm (1.6563 in.)

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Specifications

Item	Standard	Service Limit
Transmission		
Shift Fork Ear Thickness	5.9 ~ 6.0 mm (0.2323 ~ 0.2362 in.)	5.8 mm (0.2283 in.)
Shifter Groove Width	6.05 ~ 6.15 mm (0.2382 ~ 0.2421 in.)	6.25 mm (0.2461 in.)

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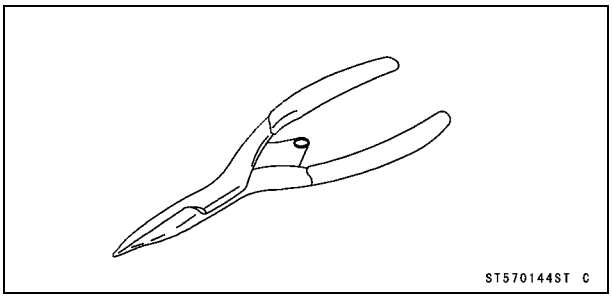
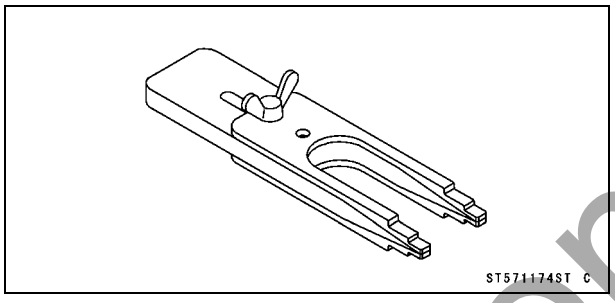
Special Tools and Sealant

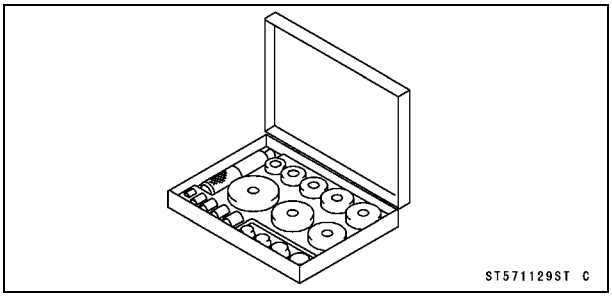
Outside Circlip Pliers:
57001-144



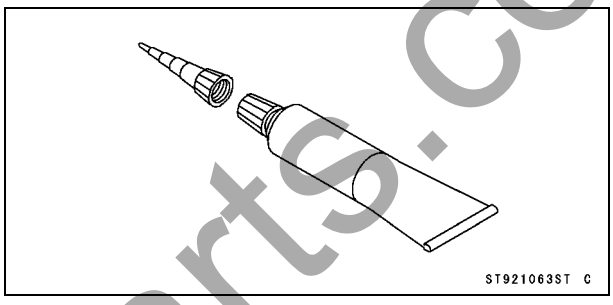
Crankshaft Jig:
57001-1174



Bearing Driver Set:
57001-1129



Liquid Gasket, TB1216:
92104-1063



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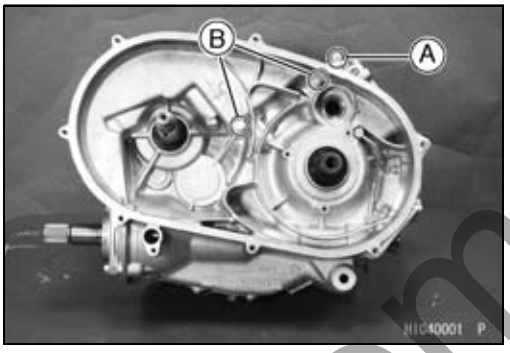
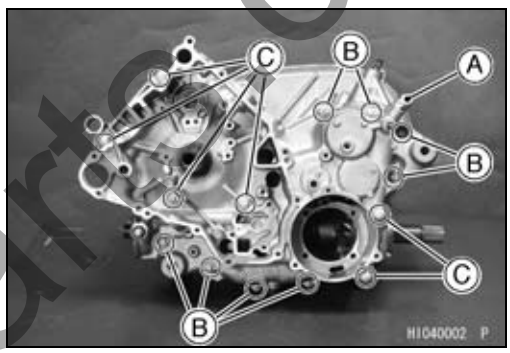
Crankcase

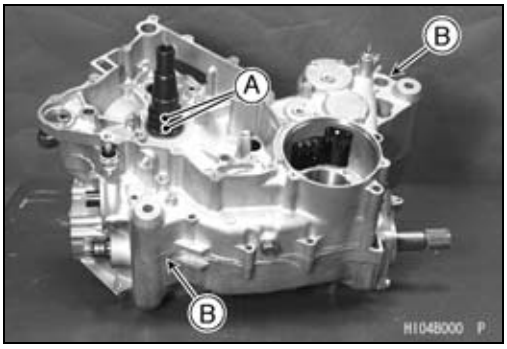
Crankcase Disassembly



- Remove:
  Engine (see Engine Removal in the Engine Removal/Installation chapter)
  Starter Motor (see Starter Motor Removal in the Electrical System chapter)
  Oil Filter (see Oil Filter Replacement in the Periodic Maintenance chapter)
  Cylinder Blocks and Pistons (see Cylinder and Piston Removal in the Engine Top End chapter)
  Intermediate Shaft and Chains (see Camshaft Chain Removal in the Engine Top End chapter)
  Right Crankcase Bolt (M6) [A]
  Right Crankcase Bolts (M8) [B]



- Remove:
  Shift Shaft Positioning Bolt [A], Washer, Spring, and Steel Ball
  Left Crankcase Bolts (M6) [B]
  Left Crankcase Bolts (M8) [C]



- Wrap the teeth on the sprockets [A] by taping for protecting the bushing in the crankcase.
- Using the pry points [B], split the crankcase halves.
- Lift off the left crankcase half.

Crankcase Assembly

NOTICE

The right and left crankcase halves are machined at the factory in the assembled state, so the crankcase halves must be replaced as a set.

NOTE

○*Be certain that all parts are cleaned thoroughly before assembly.*

○*Blow through all oil passages with compressed air to clear any blockage in the crankcase halves and crankshaft.*

⚠ WARNING

Clean the engine parts in a well-ventilated area, and take care that there are no sparks or flame anywhere near the working area; this includes any appliance with a pilot light. Do not use gasoline or low-flash point solvents to clean parts. A fire or explosion could result.

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Crankcase

- Press and insert the new ball bearings until they are bottomed.

Special Tool - Bearing Driver Set: 57001-1129

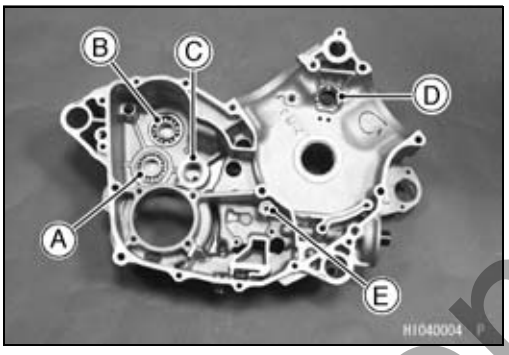
[A] Ball Bearing
[B] Ball Bearing (sealed side towards crankcase)

- Press and insert the new needle bearings so that the bearing surfaces are flush with the end of the hole.

[C] Needle Bearing
[D] Needle Bearing (Insert it from outside.)

- Apply engine oil to the bearings.
- Install:

Oil Pressure Relief Valve [E] (see Oil Pressure Relief Valve Installation in the Engine Lubrication System chapter)

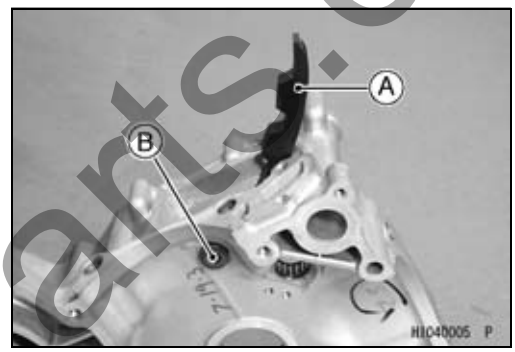


- Install:

Rear Cylinder Camshaft Chain Guide [A]

- Tighten:

Torque - Rear Cylinder Camshaft Chain Guide Bolt [B]: 20 N·m (2.0 kgf·m, 15 ft·lb)



- Press and insert the new ball bearings [A] until they are bottomed.

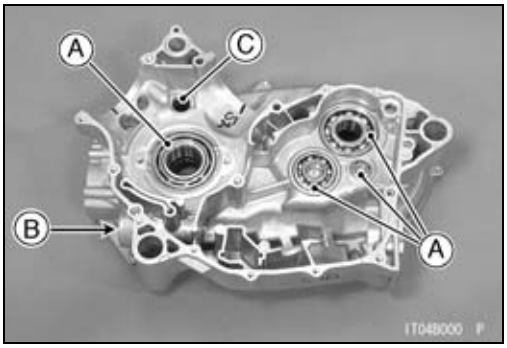
○When install the crankshaft bearing, the stepped side faces engine inside.

Special Tool - Bearing Driver Set: 57001-1129

- Press and insert the new needle bearings so that the bearing surfaces are flush with the end of the hole.

[B] Needle Bearing
[C] Needle Bearing (Insert it from outside.)

- Apply engine oil to the bearings.

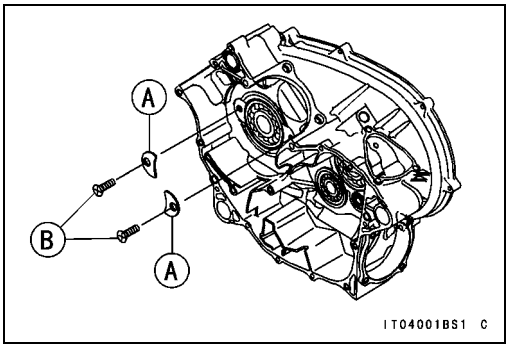


- Install:

Plates [A]
Bearing Position Plate Screws [B]

- Tighten:

Torque - Bearing Position Plate Screws: 4.9 N·m (0.50 kgf·m, 43 in·lb)



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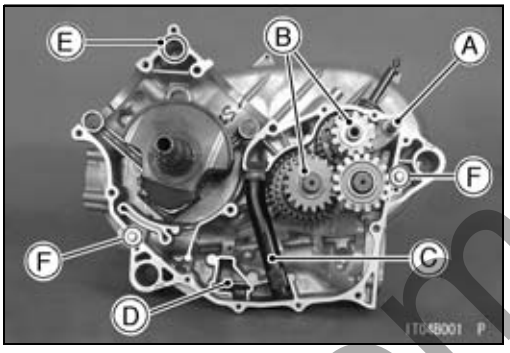
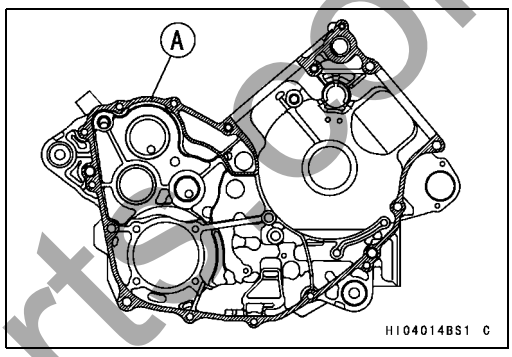
Crankcase

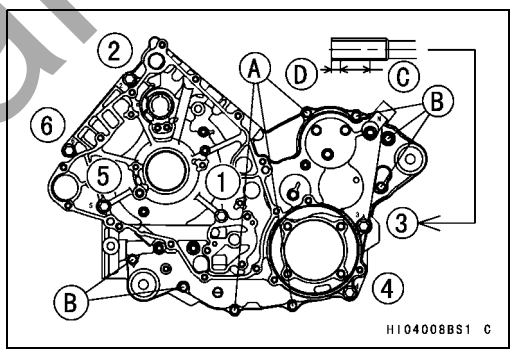
- Be sure the following parts are in place in the right crankcase half.
  Crankshaft
  Transmission Shafts and Shift Rod [A]
  Spacers [B]
  Oil Tube [C]
  Oil Screen [D]
  O-ring [E] (Apply Grease)
  Dowel Pins [F]

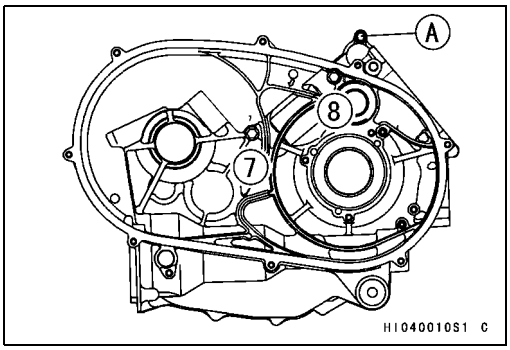


- Apply liquid gasket [A] to mating surface of the left crankcase half.
  Sealant - Liquid Gasket, TB1216: 92104-1063

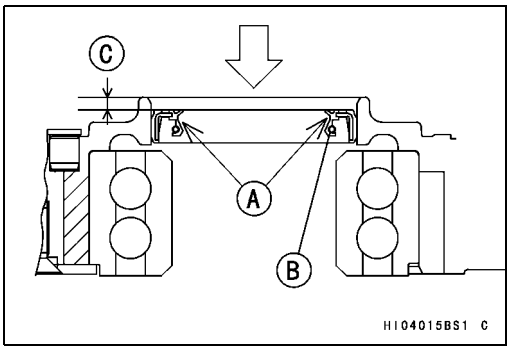


- Apply a non-permanent locking agent to the area [C] (12 mm, 0.47 in.) except for the tip [D] (2 ~ 3 mm, 0.08 ~ 0.12 in.).
  Left Crankcase Bolt (M8) [3]
- Tighten the right and left crankcase bolts (M8) following the tightening sequence [1 ~ 8].
  Torque - Crankcase Bolts (M8): 20 N·m (2.0 kgf·m, 15 ft·lb)
  [1, 2, 5, 6] L = 75 mm (2.95 in.)
  [3, 4, 7, 8] L = 110 mm (4.33 in.)
- Tighten:
  Torque - Crankcase Bolts (M6): 9.8 N·m (1.0 kgf·m, 87 in·lb)
  [A] L = 40 mm (1.57 in.)
  [B] L = 65 mm (2.56 in.)





- Grease the lip [A] of the oil seal [B] and press the seal 3 mm (0.12 in.) [C] inwards from the end of the boss.



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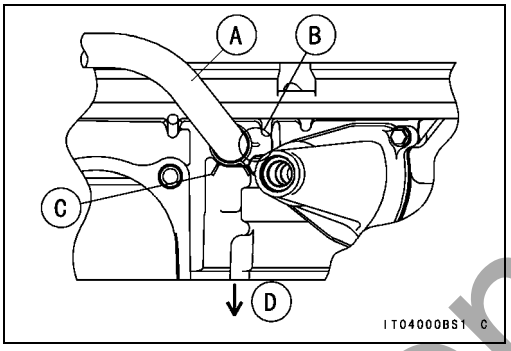
Crankcase

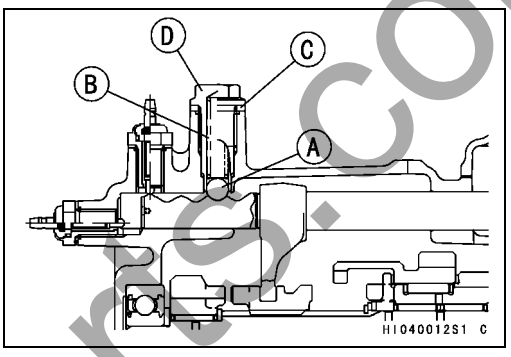
● Install the breather tube [A] on the crankcase fitting.
○Align the white line on the tube with the mark [B] on the crankcase.
○Face the open end of the clamp [C] towards the left side [D] as shown.



● Apply grease to the steel ball [A] and spring [B].
● Install:
Steel Ball
Spring
Washer [C]
Shift Shaft Positioning Bolt [D]
● Tighten:

Torque - Shift Shaft Positioning Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

● Check:
Crankshaft and driven shaft turn freely.
★If any of the shafts do not turn freely, split the crankcase to locate the problem.



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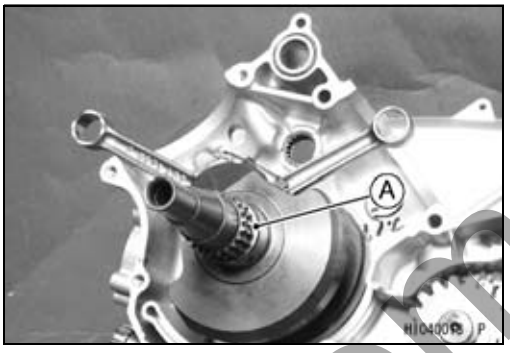
Crankshaft/Connection Rod

Crankshaft Removal

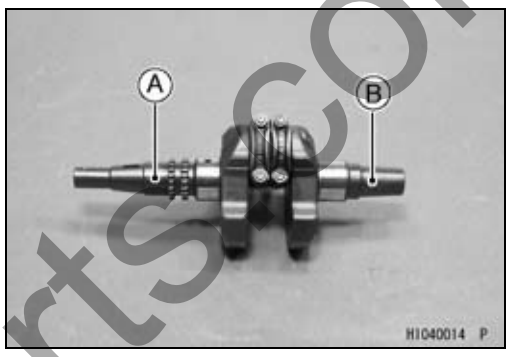
- Split the crankcase (see Crankcase Disassembly).
- Remove the crankshaft [A] from the crankcase using a press.



Crankshaft Installation

- The left shaft [A] of the crankshaft is longer than the right shaft [B].
- Apply engine oil to the both main journals.
- Insert the right crankshaft tapered end (the shorter end) into the right crankcase using a press and two crankshaft jigs.

Special Tools - Crankshaft Jig: 57001-1174 × 2



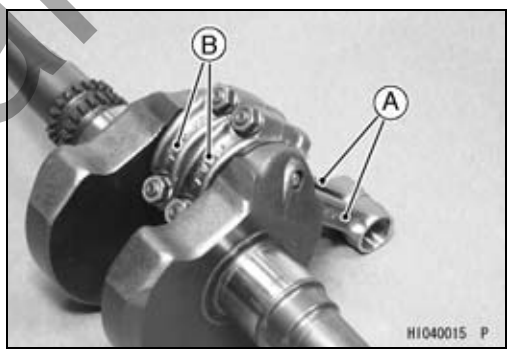
Connecting Rod Removal

- Remove the crankshaft (see Crankshaft Removal).
- Remove the connecting rods [A] from the crankshaft.

NOTE

○*Mark and record the locations of the connecting rods and their big end caps [B] so that they can be installed in their original positions.*

○Remove the connecting rod big end nuts, and take off the rod and cap with the bearing inserts.

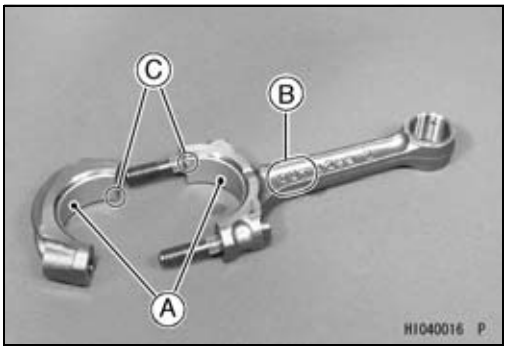


Connecting Rod Installation

NOTICE

If the connecting rods, bearing inserts, or crankshaft are replaced with new ones, select the bearing insert and check clearance with a plastigage before assembling the engine to be sure the correct bearing inserts are installed.

- Apply molybdenum disulfide oil:
  Inner Surface [A] of Bearing Inserts
- Face the “OUT” marks [B] of both connecting rods towards the outsides of the crankshaft.
- Fit the connecting rod cap so that the grooves [C] of the cap and connecting rod are on the same side.



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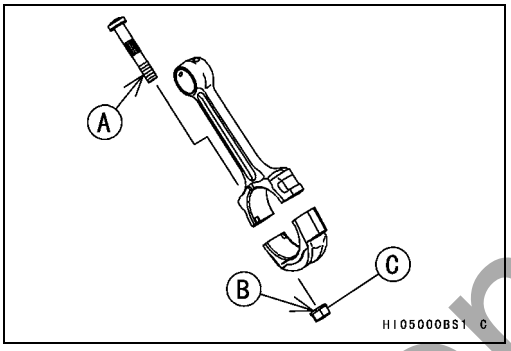
Crankshaft/Connection Rod

- Apply molybdenum disulfide oil:
  Threads [A] of Connecting Rod Big End Cap Bolts
  Seating Surface [B] of Connecting Rod Big End Cap Nuts [C]
- Tighten:

Torque - Connecting Rod Big End Cap Nuts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)



Crankshaft/Connecting Rod Cleaning

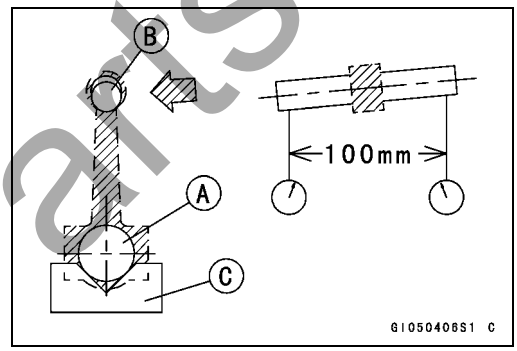
- After removing the connecting rods from the crankshaft, clean them with a high flash-point solvent.
- Blow the crankshaft oil passages with compressed air to remove any foreign particles or residue that may have accumulated in the passages.

Connecting Rod Bend Inspection

- Remove the connecting rod big end bearing inserts, and reinstall the connecting rod big end cap.
- Select an arbor [A] of the same diameter as the connecting rod big end, and insert the arbor through the connecting rod big end.
- Select an arbor of the same diameter as the piston pin and at least 100 mm (3.94 in.) long, and insert the arbor [B] through the connecting rod small end.
- On a surface plate, set the big-end arbor on a V block [C].
- With the connecting rod held vertically, use a height gauge to measure the difference in the height of the arbor above the surface plate over a 100 mm (3.94 in.) length to determine the amount of connecting rod bend.

★If connecting rod bend exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Bend
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)

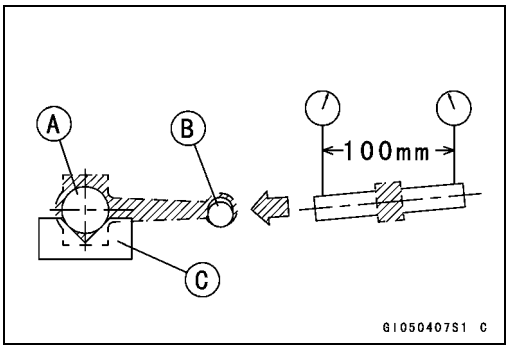


Connecting Rod Twist Inspection

- With the big-end arbor [A] still on the V block [C], hold the connecting rod horizontally and measure the amount that the arbor [B] varies from being parallel with the surface plate over a 100 mm (3.94 in.) length of the arbor to determine the amount of connecting rod twist.

★If connecting rod twist exceeds the service limit, the connecting rod must be replaced.

Connecting Rod Twist
Service Limit: TIR 0.2/100 mm (0.008/3.94 in.)



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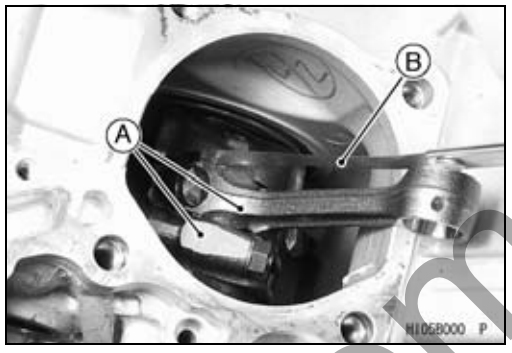
Crankshaft/Connection Rod

Connecting Rod Big End Side Clearance Inspection



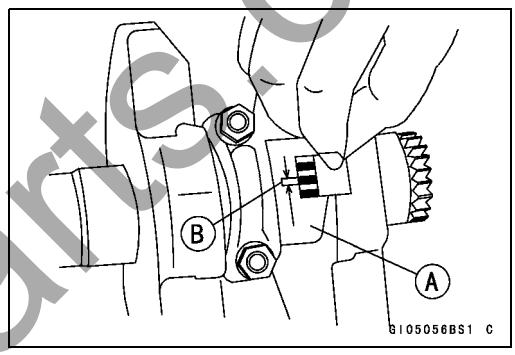
- Measure the side clearance of the connecting rod big end [A].

○Insert a thickness gauge [B] between the big end and either crank web to determine clearance.

Connecting Rod Big End Side Clearance
Standard: 0.16 ~ 0.46 mm (0.0063 ~ 0.0181 in.)
Service Limit: 0.7 mm (0.028 in.)

★If the clearance exceeds the service limit, replace the connecting rod with new one and then check clearance again. If clearance is too large after connecting rod replacement, the crankshaft also must be replaced.

Connecting Rod Big End Bearing/Crankpin Wear Inspection



- Measure the bearing insert/crankpin [A] clearance with plastigage [B].

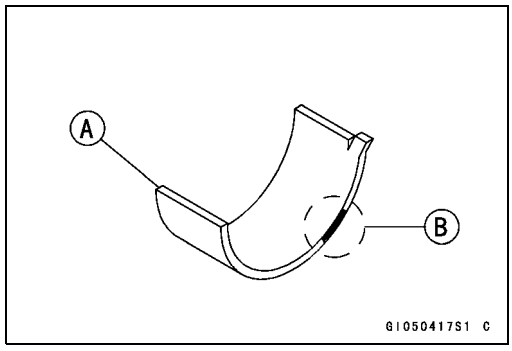
○Tighten the big end cap nuts to the specified torque.

Torque - Connecting Rod Big End Cap Nuts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)

NOTE

○*Do not move the connecting rod and crankshaft during clearance measurement.*

Connecting Rod Big End Bearing Insert/Crankpin Clearance
Standard: 0.028 ~ 0.052 mm (0.0011 ~ 0.0020 in.)
Service Limit: 0.09 mm (0.0035 in.)



★If the clearance is within the standard, no bearing insert replacement is required.

★If the clearance is between 0.052 mm (0.0020 in.) and the service limit 0.09 mm (0.0035 in.), replace the bearing inserts [A] with inserts painted green [B]. Check insert/crankpin clearance with plastigage. The clearance may exceed the standard slightly, but it must not be less than the minimum in order to avoid bearing seizure.

★If the clearance exceeds the service limit, measure the diameter of the crankpin.

Crankpin Diameter
Standard: 39.984 ~ 40.000 mm (1.5742 ~ 1.5748 in.)
Service Limit: 39.97 mm (1.5736 in.)

★If the crankpin has worn past the service limit, replace the crankshaft with a new one.

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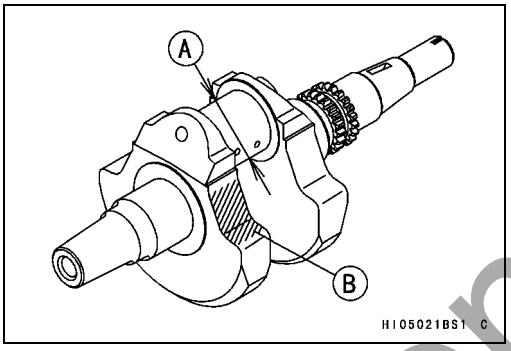
Crankshaft/Connection Rod

★If the measured crankpin diameter [A] is not less than the service limit, but does not coincide with the original diameter marking on the crankshaft, make a new mark on it.



Crankpin Diameter Marks

None: 39.984 ~ 39.992 mm (1.5742 ~ 1.57449 in.)

○: 39.993 ~ 40.000 mm (1.57452 ~ 1.5748 in.)

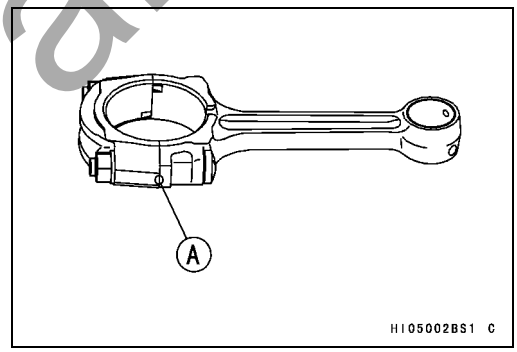
Crankpin Diameter Mark [B]: "○" mark or no mark

- Measure the connection rod big end inside diameter, and mark each connecting rod big end in accordance with the inside diameter.
- Tighten the big end nuts to the specified torque.

Torque - Connecting Rod Big End Cap Nuts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)

NOTE

○*The mark already on the big end should almost coincide with the measurement because of little wear.*



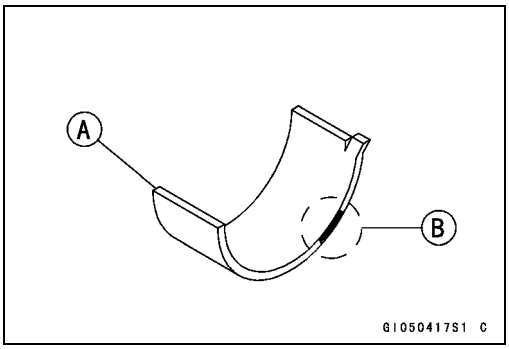
Connecting Rod Big End Inside Diameter Marks

None: 43.000 ~ 43.008 mm (1.6929 ~ 1.69322 in.)

○: 43.009 ~ 43.016 mm (1.69326 ~ 1.6935 in.)

Diameter Mark [A]: "○" or no mark

- Select the proper bearing insert [A] in accordance with the combination of the connecting rod and crankshaft coding. Size Color [B]



Big End Bearing Insert Selection

Con-rod Big End Bore Diameter Mark	Crankpin Diameter Mark	Bearing Insert	
		Size Color	Part Number
None	○	Brown	92028-1963
None	None	Yellow	92028-1962
○	○		
○	None	Green	92028-1961

- Install the new inserts in the connecting rod and check insert/crankpin clearance with the plastigage.

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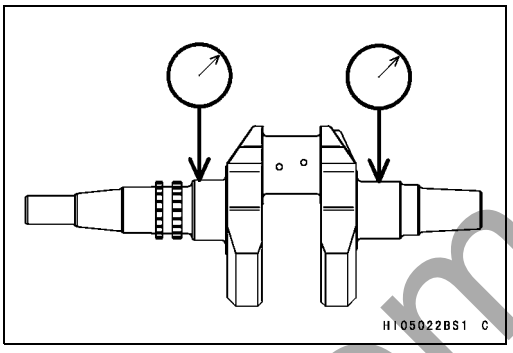
Crankshaft/Connection Rod

Crankshaft Runout Inspection

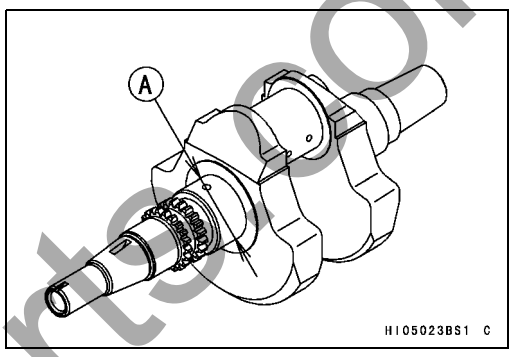


- Measure the crankshaft runout.

★If the measurement exceeds the service limit, replace the crankshaft.

Crankshaft Runout
Standard: TIR 0.04 mm (0.0016 in.) or less
Service Limit: TIR 0.10 mm (0.0039 in.)

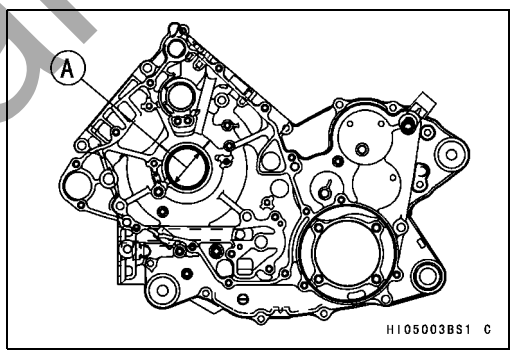
Crankshaft Main Bearing/Journal Wear Inspection



- Measure the diameter [A] of the crankshaft main journal.

Crankshaft Main Journal Diameter
Standard: 41.984 ~ 42.000 mm (1.6529 ~ 1.6535 in.)
Service Limit: 41.96 mm (1.6520 in.)

★If any journal has worn past the service limit, replace the crankshaft with a new one.



- Measure the main bearing bore diameter [A] in the crankcase halves.

Crankcase Main Bearing Bore Diameter
Standard: 42.025 ~ 42.041 mm (1.6545 ~ 1.6552 in.)
Service Limit: 42.07 mm (1.6563 in.)

★If there is any signs of seizure, damage, or excessive wear, replace the crankcase halves as a set.

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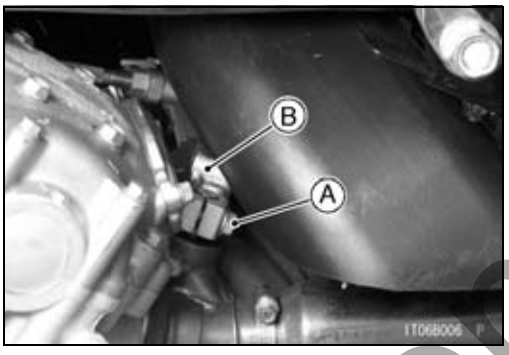
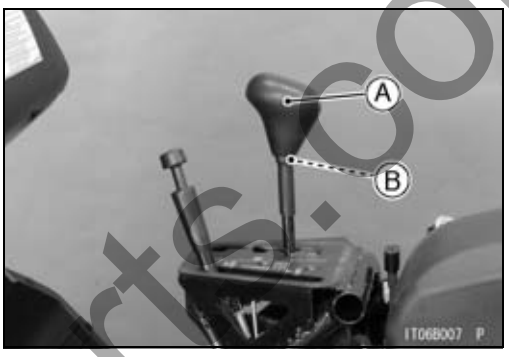
Transmission

Shift Lever Removal

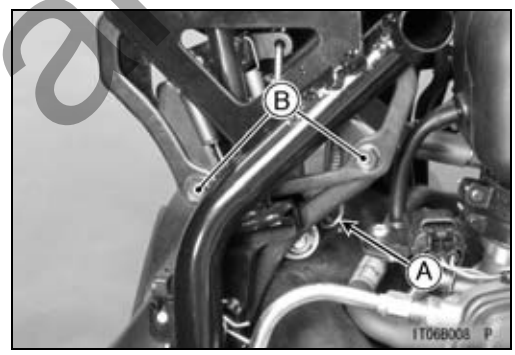
- Set the shift lever in the neutral position.
- Remove:
  Seat Lower Cover (see Seat Lowe Cover Removal in the Frame chapter)
  Shift Shaft Lever Bolt [A]
- Remove the shift shaft lever [B] from the shift shaft.



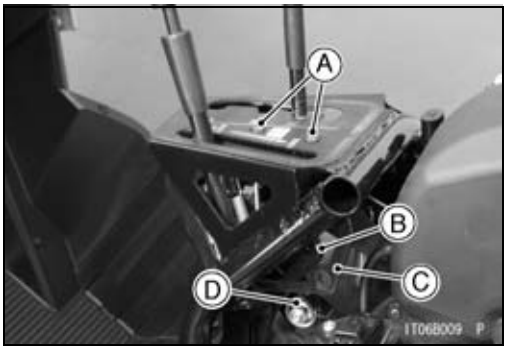
- Remove:
  Grip [A]
  Grip Hold Nut [B]



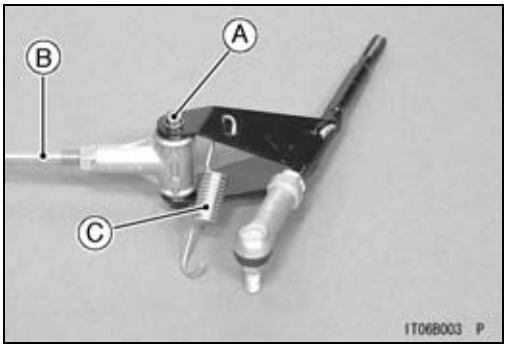
- Remove:
  Spring [A]
  Ratchet Assembly Bolts [B]



- Remove:
  Allen Bolts [A]
- Move the ratchet [B] and bracket [C] forward.
- Remove:
  Shift Lever Assembly Nut [D]



- Remove:
  Tie-rod End Bolt [A]
  Tie-rod [B]
  Spring [C]



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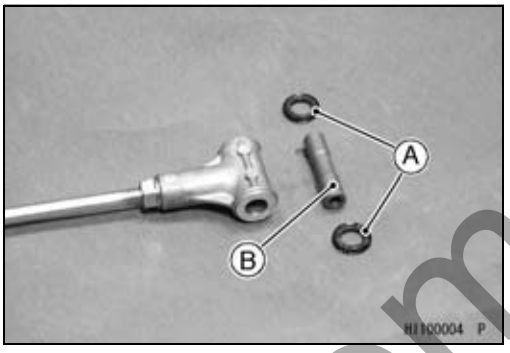
Transmission

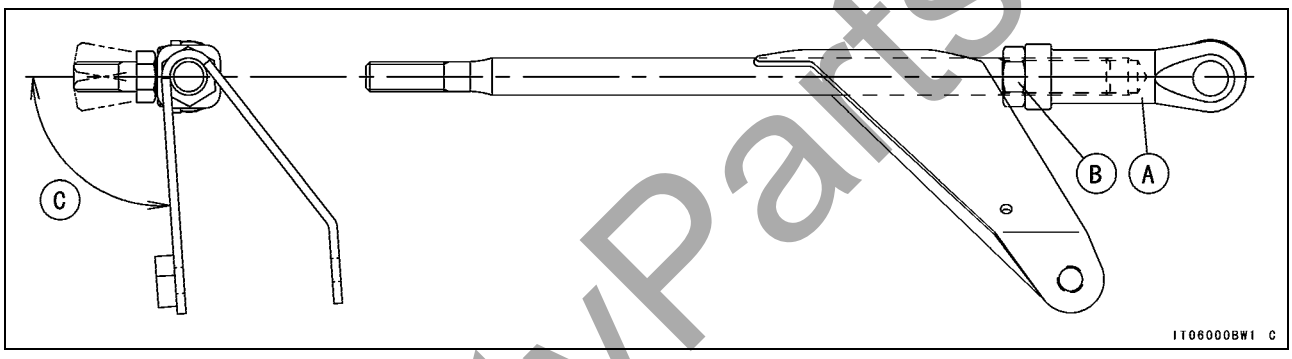
● Remove:
Oil Seals [A]
Collar [B]



Shift Lever Installation

● Twist the tie-rod end [A] and tie-rod end locknut [B] to bottom of the screw and then turn back the tie-rod end to dimension with 94° ±10° [C] as shown in the figure.
● Tighten the locknut against the tie-rod end:

Torque - Tie-rod End Locknut: 19.6 N·m (2.0 kgf·m, 14 ft·lb)



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Transmission

- Align the mark [A] on the shaft end with the slit [B] of the shift shaft lever.
- Position the shift shaft lever end [C] on the boss-center [D] of the crankcase as shown in the figure.
- Tighten:

Torque - Shift Shaft Lever Bolt [E]: 13.5 N·m (1.4 kgf·m, 10 ft·lb)

- Install:
  Shift Lever Assembly [F]
  Spring [G] (to Shift Lever Assembly)
  Washer [H]
  Shift Lever Assembly Nut [I]
- Tighten:

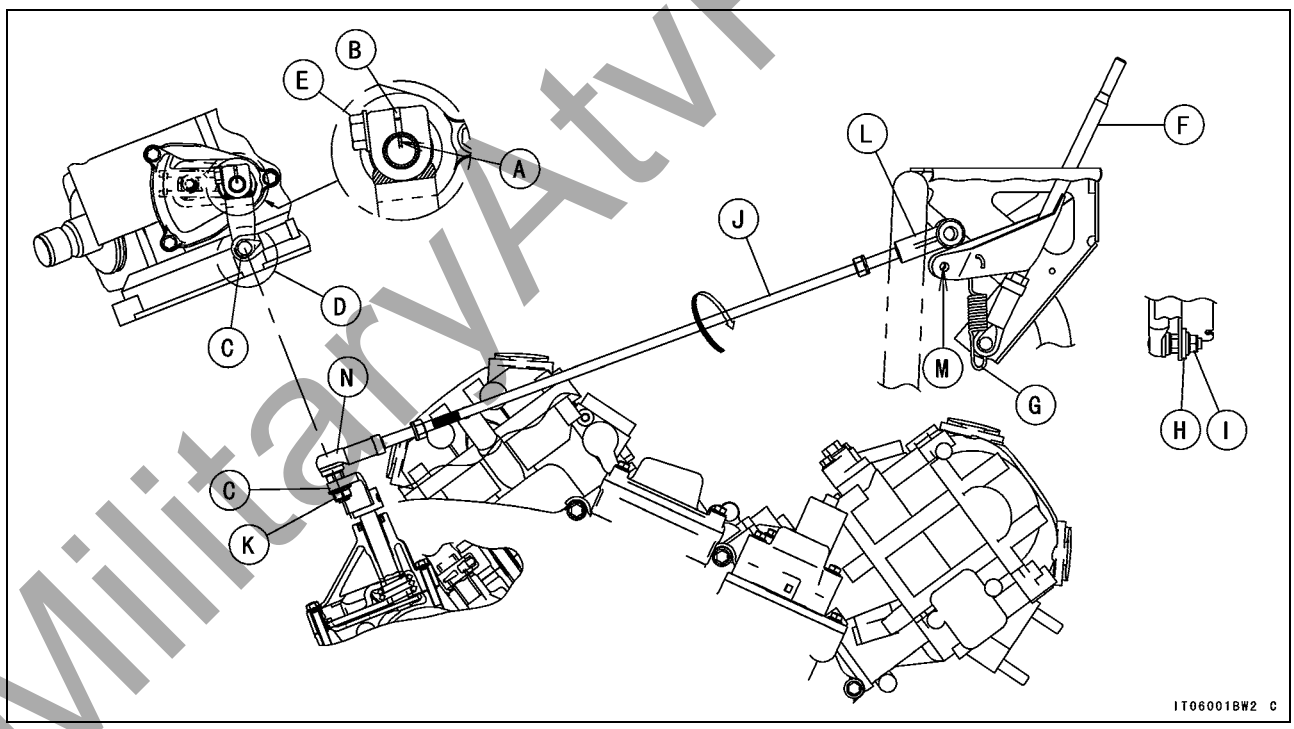
Torque - Shift Lever Assembly Nut: 19.6 N·m (2.0 kgf·m, 14 ft·lb)

- Install:
  Tie-rod [J]
- Tighten:

Torque - Tie-rod End Nut [K]: 19.6 N·m (2.0 kgf·m, 14 ft·lb)

- Turn the tie-rod until the upper tie-rod end [L] will be adjusted to hole [M] of the shift lever assembly as shown in the figure.

○The connection length of the upper and lower tie-rod end [N] should be equal.



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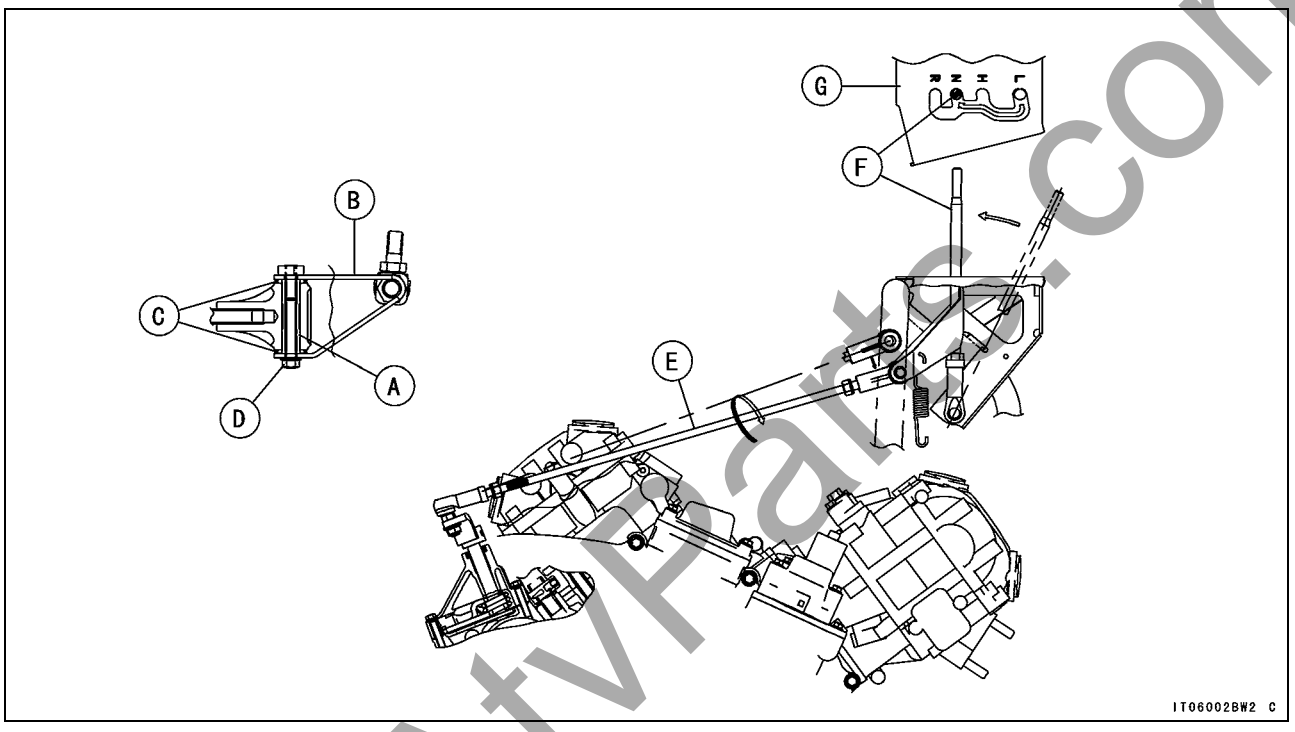
Transmission

- Apply molybdenum disulfide grease to the collar [A].
- Install the following parts to the shift lever assembly [B].
  Oil Seals [C]
  Tie-rod End Bolt [D]
- Tighten:

Torque - Tie-rod End Bolt: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Turn the tie-rod [E] and align the lever [F] with neutral position of the guide [G] as shown in the figure.



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Transmission

- Tighten the tie-rod end rear locknut [A] so that the thread length is 6 mm (0.24 in.) [B].

Torque - Tie-rod End Rear Locknut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Holding the rear tie-rod end [C], and tighten the front locknut [D] so that the thread length is 6 mm (0.24 in.) [B].

Torque - Tie-rod End Front Locknut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

NOTE

○*The front locknut has left-hand threads.*
○*The thread length [B] of the front and rear are almost same.*
○*Do not lean the tie-rod rear end after tightening the front locknut.*

Right [E]
Wrong [F]

- Install the lower end of the spring [G] to the bracket.
- Confirm the lever [H] does not scrub the ditch of guide excessively, when the lever leaned to right side [I].

Clearance [J] ≒ 0 mm (0 in.)
8 mm (0.31 in.) [K]
18 mm (0.71 in.) [L]
Lighting Range [M] of Neutral Indicator Light

- If the excessive friction [N] occurs to the lever and the ditch of guide, readjust the thread length of the tie-rod.

Good [O]
Readjustment [P]

- Tighten the grip hold nut [Q] lightly by finger until it is stopped.
- Twist the grip [R] to bottom of the screw and then turn back in accordance with the direction of figure.

○In view of [S], the mark [T] becomes the position of figure.

- Hold the grip and tighten the grip hold nut.

Torque - Grip Hold Nut: 9.8 N·m (1.0 kgf·m, 87 in·lb)

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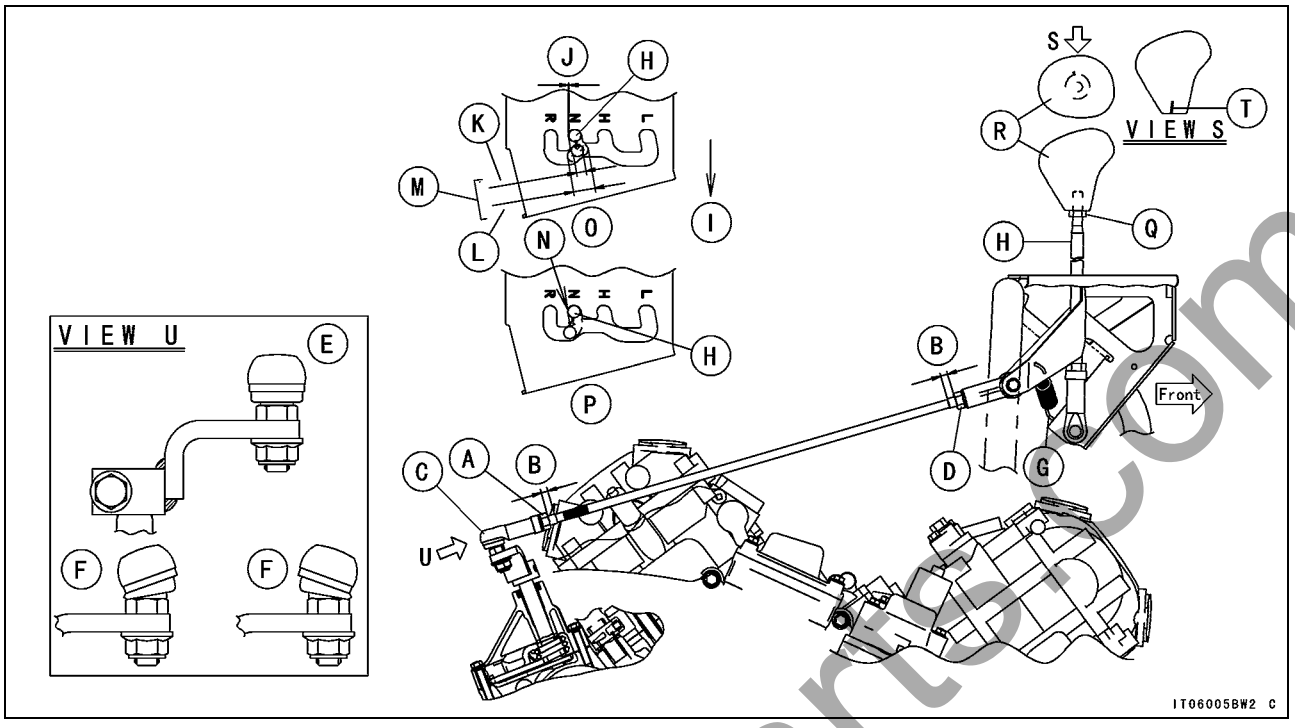
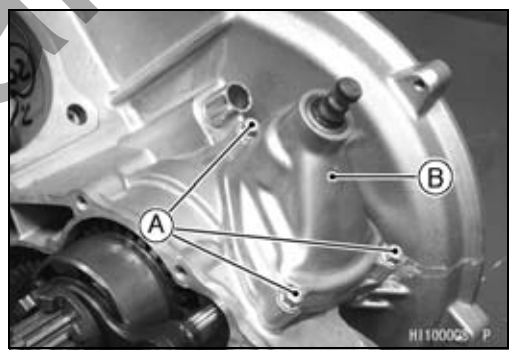
Transmission

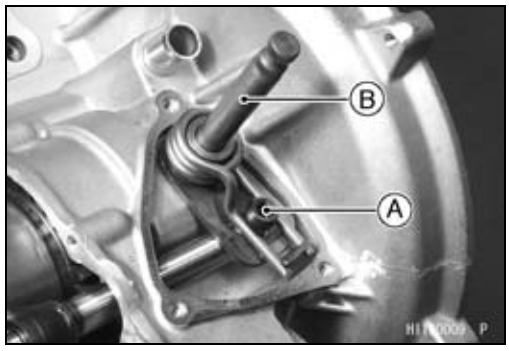


Transmission Removal

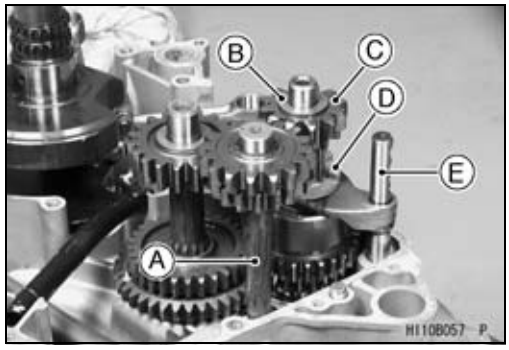
- Split the crankcase (see Crankcase Disassembly).
- Remove:
  Shift Shaft Cover Bolts [A]
  Shift Shaft Cover [B]



- Remove:
  Shift Shaft Spring Bolt [A]
  Shift Shaft [B]



- Remove:
  Reverse Idle Shaft [A]
  Spacer [B]
  Reverse Drive Gear [C], Needle Bearing, and Spacer
  Shifter [D]
  Shift Rod [E]



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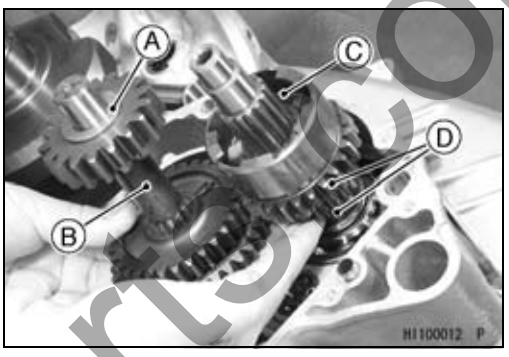
Transmission

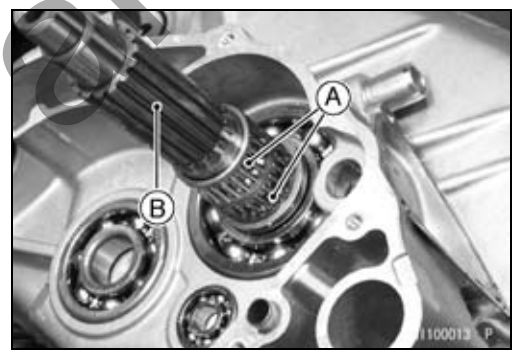
- Remove:
  Circlip [A]

  Special Tool - Outside Circlip Pliers: 57001-144

- Remove:
  Spacer [A]
  Idle Gear Assembly [B]
  Washers and Spacer [C]
  Low and High Gears [D]

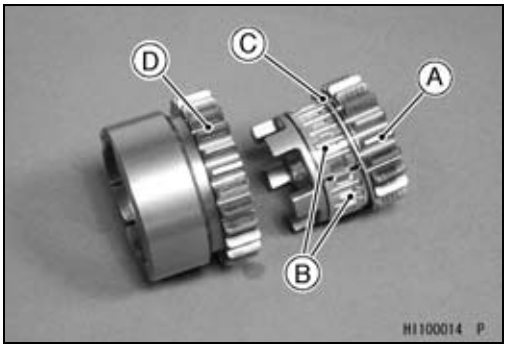


- Remove:
  Needle Bearings [A]
- Remove the driven shaft [B] from the crankcase using a press.



Transmission Installation

- Insert the driven shaft in the crankcase until it is bottomed using a press.
- Apply engine oil to the needle bearings and install them.
- Install the following parts on the low gear [A].
  Needle Bearings [B]
  Spacer [C] (P/No. 92026-1599, 48.2 × 54.3 × 1.0)
  High Gear [D]



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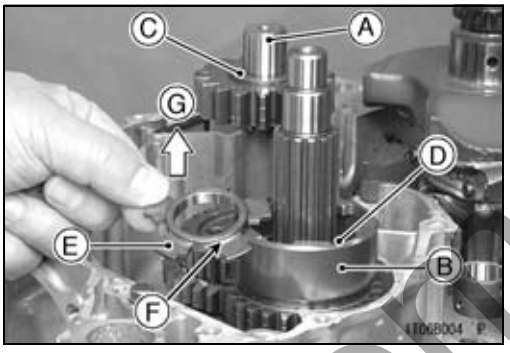
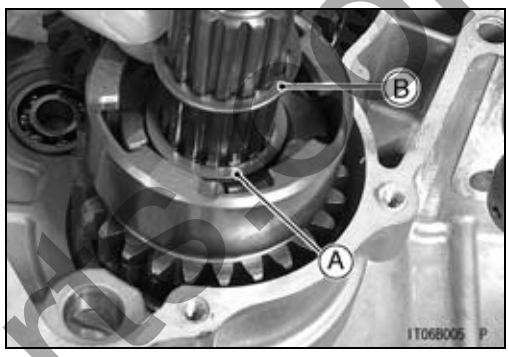
Transmission

- Apply engine oil to the journal of the idle shaft [A].
- Install:
  Idle Shaft with Gear Assembly [B]
  Spacer [C]
  Spacer [D] (P/No. 92026-1599, 48.2 × 54.3 × 1.0)
- Apply engine oil to the inner surface of the spacer [E].
- Install the spacer [E] so that the rounded side [F] faces outward [G].

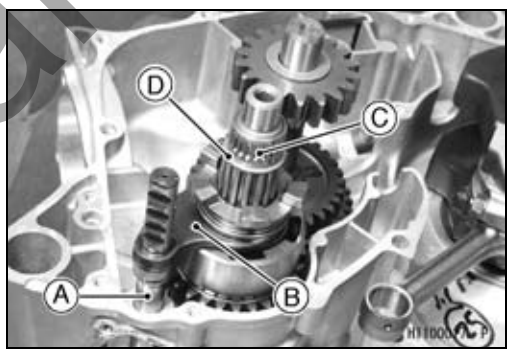


- Install:
  Spacer [A]
  Toothed Washer [B]
  Circlip

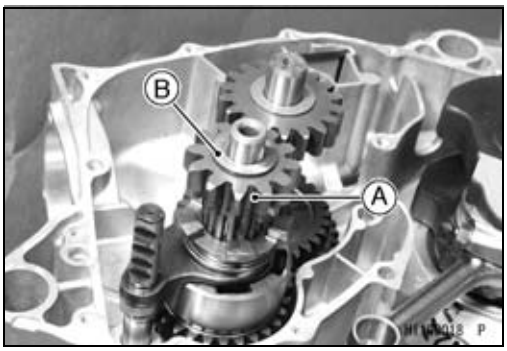
Special Tool - Outside Circlip Pliers: 57001-144



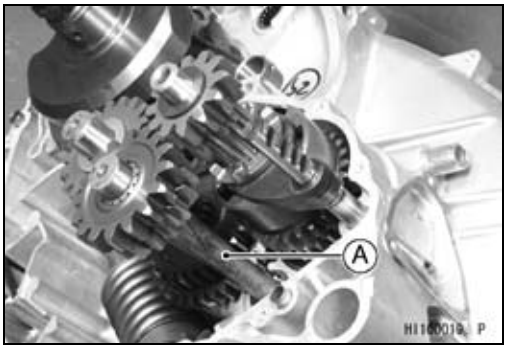
- Apply engine oil:
  Shift Rod [A] and Shift Fork Ear [B]
  Needle Bearing [C]
- Install:
  Shift Rod with Shift Fork
  Spacer [D]
  Needle Bearing



- Install:
  Reverse Drive Gear [A]
  Spacer [B]



- Install:
  Reverse Idle Shaft [A]



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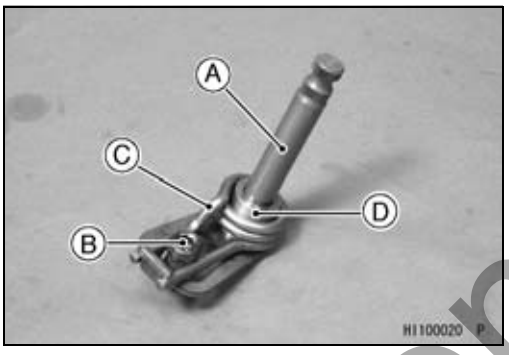
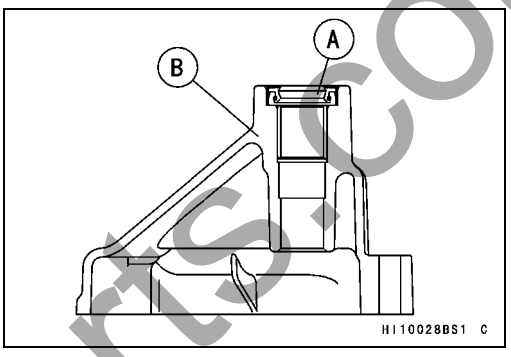
Transmission



- Apply molybdenum disulfide oil to the shift shaft [A].
- Install:
  Shift Shaft Spring Bolt [B]
  Spring [C]
  Guide [D]
- Apply a non-permanent locking agent (Three Bond: TB2471 Blue) to the shift shaft spring bolt.
- Tighten:

Torque - Shift Shaft Spring Bolt: 25 N·m (2.5 kgf·m, 18 ft·lb)

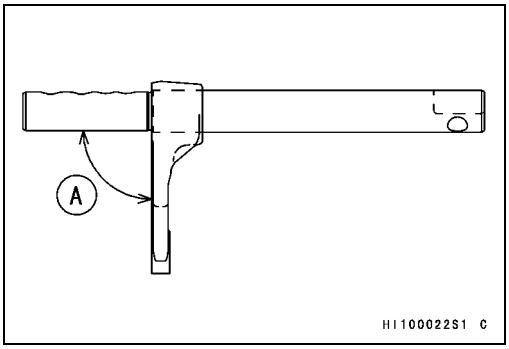


- When an oil seal [A] is installed in the shift shaft cover [B], press and insert the oil seal so that its surface is flush with the end of the hole.

- Install:
  Shift Shaft Cover
- Tighten:

Torque - Shift Shaft Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

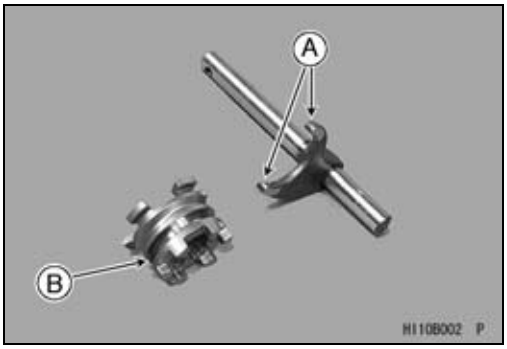
Shift Fork Bending Inspection



- Visually inspect the shift fork.

★If the fork is bent, replace the shift rod with a new one. A bent fork could cause difficulty in shifting, or allow the transmission to jump out of gear when under power.
[A] 90°

Shift Fork/Gear and Shifter Groove Wear Inspection



- Measure the thickness of the shift fork ears [A], and measure the width [B] of the shifter groove.

★If the thickness of a shift fork ear is less than the service limit, the shift rod must be replaced.

Shift Fork Ear Thickness
Standard: 5.9 ~ 6.0 mm (0.2323 ~ 0.2362 in.)
Service Limit: 5.8 mm (0.2283 in.)

★If the groove is worn over the service limit, the shifter must be replaced.

Shifter Groove Width
Standard: 6.05 ~ 6.15 mm (0.2382 ~ 0.2421 in.)
Service Limit: 6.25 mm (0.2461 in.)

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Transmission

Transmission and Shift Mechanism Inspection

● Visually inspect:
Gears
Dogs of Gear and Shifter
★If they are damaged or worn excessively, replace them.

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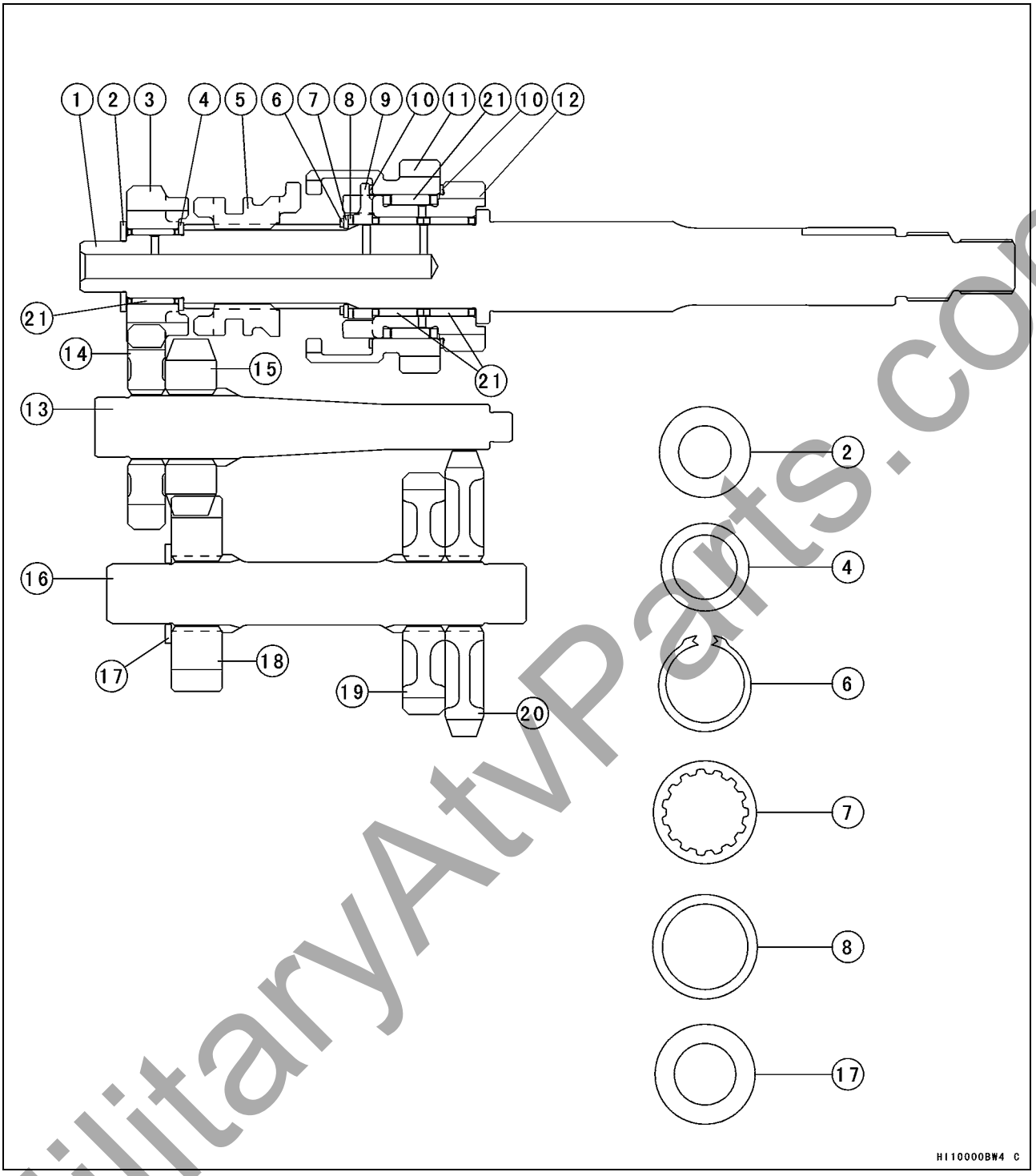
Transmission



1. Driven Shaft
2. Spacer (17.3 × 30 × 2.0)
3. Reverse Gear (12T)
4. Spacer (21.2 × 29 × 1.6)
5. Shifter
6. Circlip
7. Toothed Washer T = 1.5
8. Spacer (28.2 × 34.5 × 1.6)
9. Spacer (Hi and Low)
10. Spacer (48.2 × 54.3 × 1.0)
11. Drive Hi Gear (26T)
12. Drive Low Gear (20T)
13. Reverse Idle Shaft
14. Reverse Driven Gear (16T)
15. Reverse Driven Output Gear (16T)
16. Idle Shaft
17. Spacer (20.3 × 33 × 2.0)
18. Driven Output Gear (18T)
19. Driven Hi Gear (30T)
20. Driven Low Gear (36T)
21. Needle Bearing

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Ball Bearing, Needle Bearing, and Oil Seal

Ball and Needle Bearing Replacement

NOTICE

Do not remove the ball or needle bearings unless it is necessary. Removal may damage them.

- Using a press or puller, remove the ball bearing and/or three needle bearings.

NOTE

○*In the absence of the above mentioned tools, satisfactory results may be obtained by heating the case to approximately 93°C (200°F) max., and tapping the bearing in or out.*

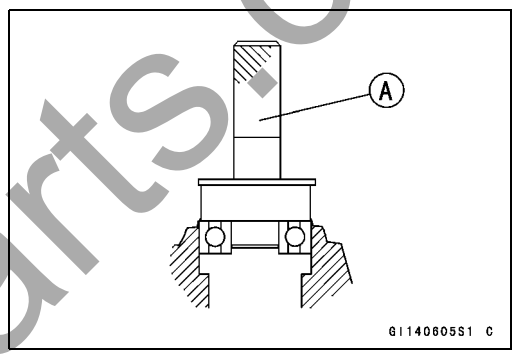
NOTICE

Do not heat the case with a torch. This will warp the case. Soak the case in oil and heat the oil.

- Using a press and the bearing driver set [A], install the new ball bearing until it stops at the bottom of its housing.

○Three new needle bearings must be pressed into the crankcase so that the end is flush with the end of the hole.

Special Tool - Bearing Driver Set: 57001-1129



Ball and Needle Bearing Wear Inspection

NOTICE

Do not remove the bearings for inspection. Removal may damage them.

- Check the ball bearings.

○Since the ball bearings are made to extremely close tolerances, the wear must be judged by feel rather than measurement. Clean each bearing in a high-flash point solvent, dry it (do not spin the bearing while it is dry), and oil it with engine oil.

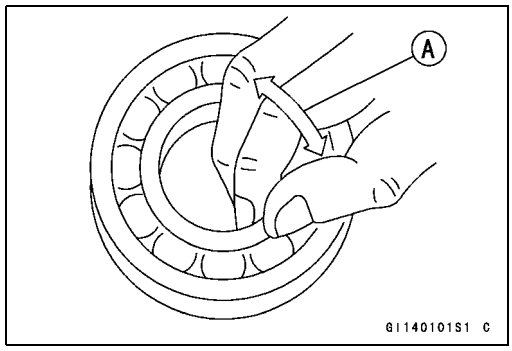
○Spin [A] the bearing by hand to check its condition.

★If the bearing is noisy, does not spin smoothly, or has any rough spots, replace it.

- Check the needle bearings.

○The rollers in a needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a needle bearing, replace it.



Oil Seal Inspection

- Inspect the oil seals.

★Replace it if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened or otherwise damaged.

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Wheels/Tires

Table of Contents

Exploded View 10-2
Specifications 10-4
Special Tools 10-5
Wheel Alignment 10-6
  Toe-in Inspection 10-6
  Toe-in Adjustment 10-6
Wheels (Rims) 10-8
  Wheel Removal 10-8
  Wheel Installation 10-8
  Wheel (Rim) Inspection 10-8
  Wheel (Rim) Replacement 10-9
Tires 10-10
  Tire Removal 10-10
  Tire Installation 10-10
  Tire Inspection 10-11
Front Hub 10-12
  Front Hub Removal 10-12
  Front Hub Installation 10-13
  Front Hub Disassembly/Assembly 10-14
Rear Hub 10-15
  Rear Hub Removal 10-15
  Rear Hub Installation 10-15
  Rear Hub Disassembly/Assembly 10-16

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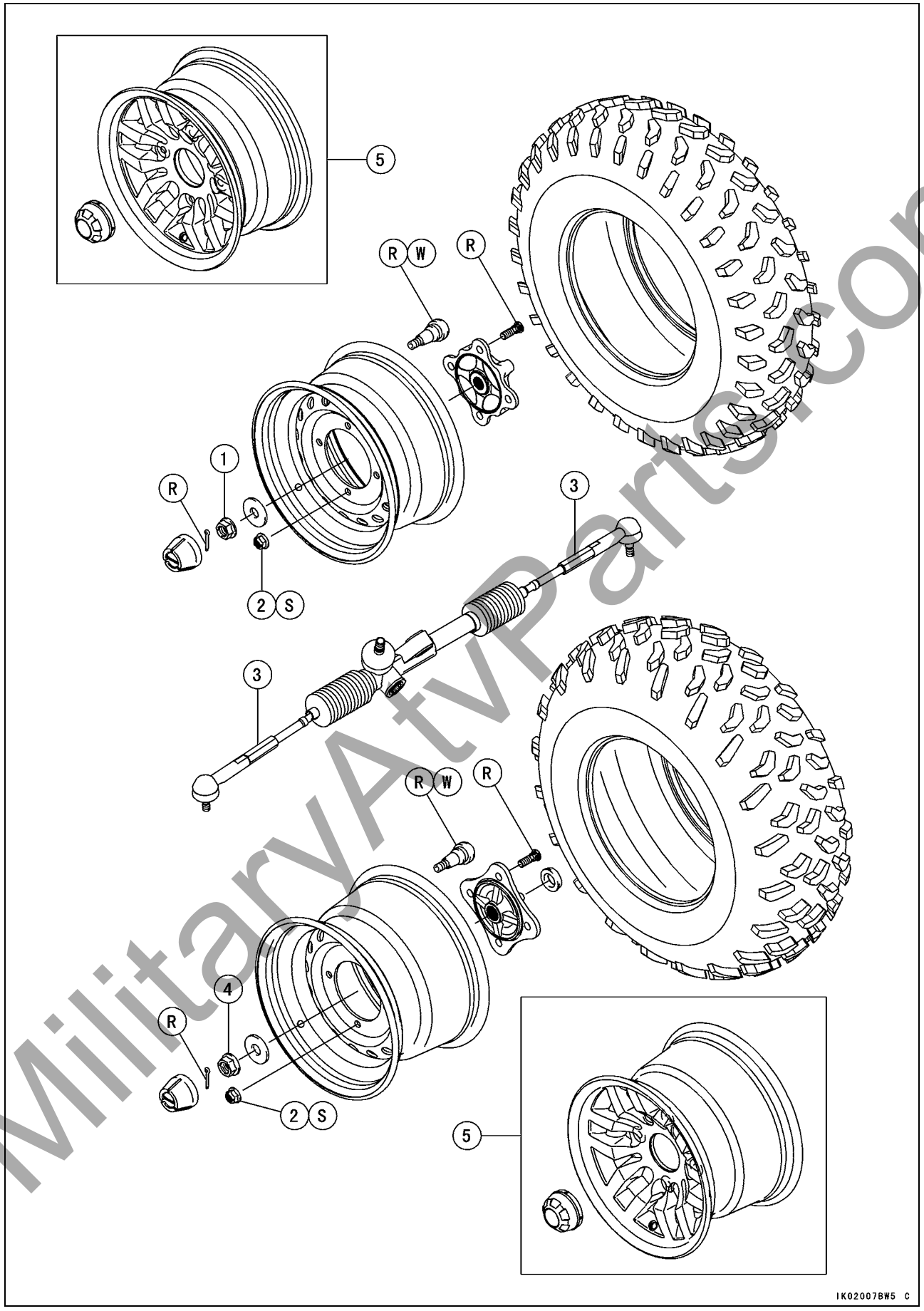
10-2 WHEELS/TIRES

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Axle Nuts	266	27.1	196	
2	Front Wheel Nuts	110	11.2	81	S
	Rear Wheel Nuts	110	11.2	81	S
3	Tie-rod End Locknuts	44	4.5	32	
4	Rear Axle Nuts	266	27.1	196	

5. KRF750S Model
R: Replacement Parts
S: Follow the specified tightening sequence.
W: Apply water or soap and water solution.

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Specifications

Item	Standard	Service Limit
Wheel Alignment		
Caster	2.2° (non-adjustable)	– – –
Camber:		
Front	–0.7° (non-adjustable)	– – –
Rear	–0.4° (non-adjustable)	– – –
Toe-in	20 ~ 40 mm (0.79 ~ 1.57 in.) at 1G	– – –
Wheels (Rims)		
Rims Size:		
Front	12 × 6.0AT	– – –
Rear	12 × 8.0AT	– – –
Tires		
Standard Tire:		
Front	26 × 8.00-12 MAXXIS, M989, Tubeless	– – – – – –
Rear	26 × 10.00-12 MAXXIS, M990, Tubeless	– – – – – –
Tire Air Pressure (when cold):		
Front	60 kPa (0.6 kgf/cm², 8.7 psi)	– – –
Rear	90 kPa (0.9 kgf/cm², 13.1 psi)	– – –
Maximum Tire Air Pressure (to seat beads, when cold)	250 kPa (2.5 kgf/cm², 36 psi)	– – –
Tire Tread Depth:		
Front	– – –	4 mm (0.16 in.)
Rear	– – –	4 mm (0.16 in.)

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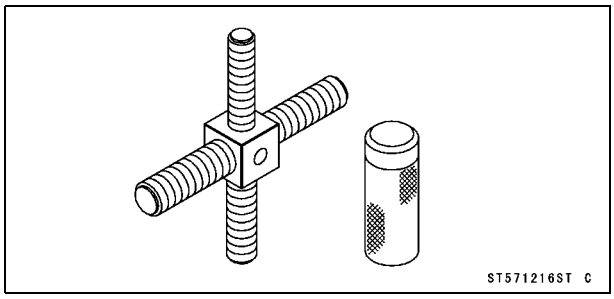
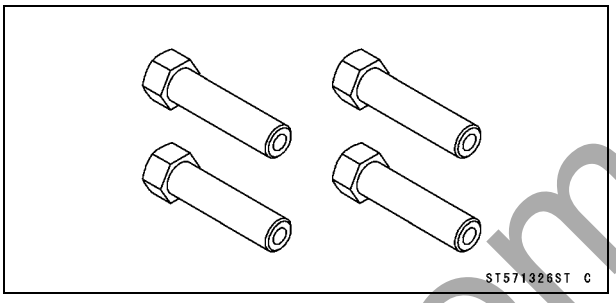
Special Tools

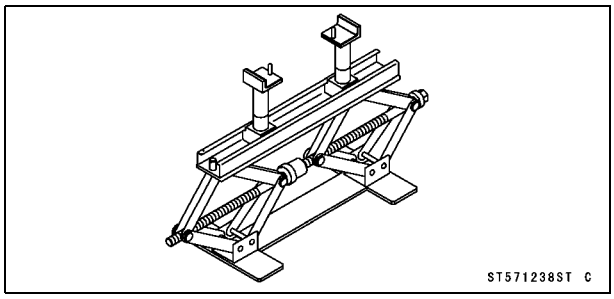
Rotor Puller, M16/M18/M20/M22 × 1.5:
57001-1216



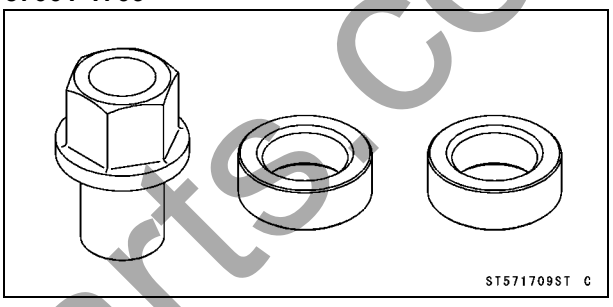
Brake Drum Remover Nuts:
57001-1326



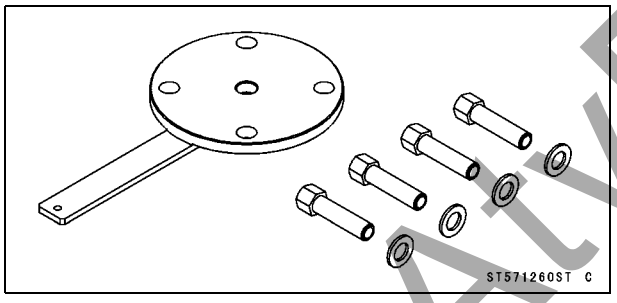
Jack:
57001-1238



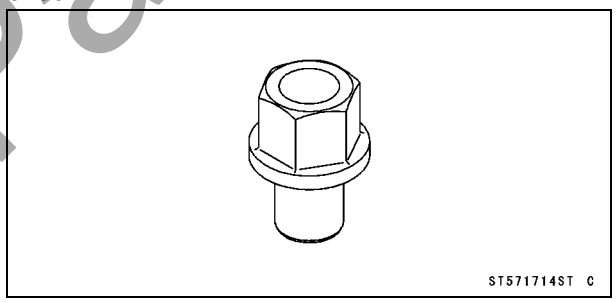
Brake Drum Pusher & Washer:
57001-1709



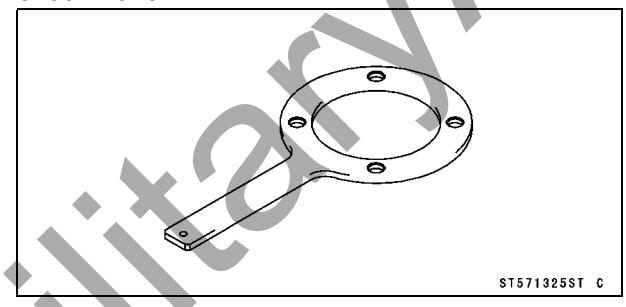
Brake Drum Remover:
57001-1260



Brake Drum Pusher:
57001-1714



Brake Drum Holder:
57001-1325



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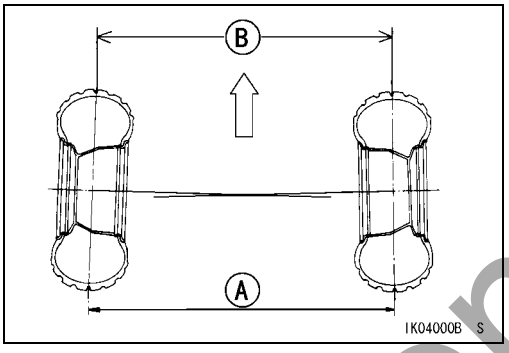
Wheel Alignment

Toe-in is the difference between the distance of front and the one of rear at the axle height position in the front wheels. When there is toe-in, the distance A (Rear) is the greater than B (Front) as shown.

The purpose of toe-in is to prevent the front wheels from getting out of parallel at any time, and to prevent any slipping or scuffing action between the tires and the ground. If toe-in is incorrect, the front wheels will be dragged along the ground, scuffing and wearing the tread knobs.

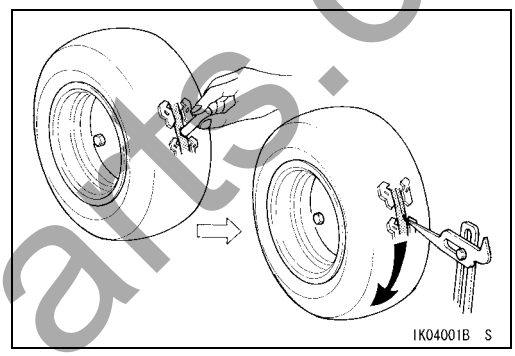
Caster and camber are build-in and require no adjustment.

A (Rear) – B (Front) = Amount of Toe-in
(Distance A and B are measured at axle height with the vehicle sitting on the ground, or at 1G.)



Toe-in Inspection

- Lift the front wheels off the ground.
- Apply a heavy coat of chalk near the center of the front tires.
- Using a needle nose scriber, make a thin mark near the center of the chalk coating while turning the wheel.
- Set the wheels so that the marks on the tires are at the front side and at the level of the axle height.
- Ground the front wheels.



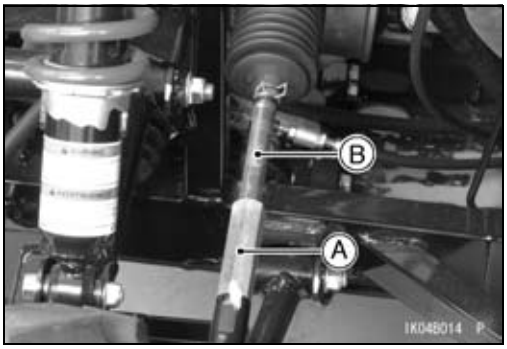
- Set the steering wheel straight ahead.
- At the level of the axle height, measure the distance between the scribed lines with a measure.
- Move the vehicle rearward until the marks on the front tires are at the rear side and at the same level as the axle.
- Measure the distance between the scribed lines.
- Subtract the measurement of the front from the measurement of the rear to get the toe-in.

Toe-in of Front Wheels
Standard: 20 ~ 40 mm (0.79 ~ 1.57 in.) at 1G

★If the toe-in is not the specified range,go on to the Toe-in Adjustment procedure.

Toe-in Adjustment

- Loosen the locknuts [A] on each tie-rod and turn the adjusting rods [B] the same number of turns and the same direction on both sides to achieve the specified toe-in.



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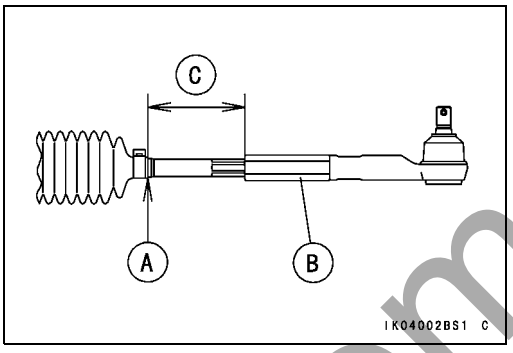
Wheel Alignment

NOTE

○*The toe-in will be near the specified range, if the length of the tie-rod distance between the dust boot end [A] of steering gear assembly and the locknut [B] is 80 mm (3.15 in.) [C] on both the left and right tie-rods.*



- Tighten:

  Torque - Tie-rod End Locknuts: 44 N·m (4.5 kgf·m, 32 ft·lb)

- Check the toe-in again.
- Test drive the vehicle.

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Wheels (Rims)

Wheel Removal

- Loosen the wheel nuts [A].
- Lift the wheels off the ground.

Special Tool - Jack: 57001-1238

- Remove:
  Wheel Nuts
  Wheel

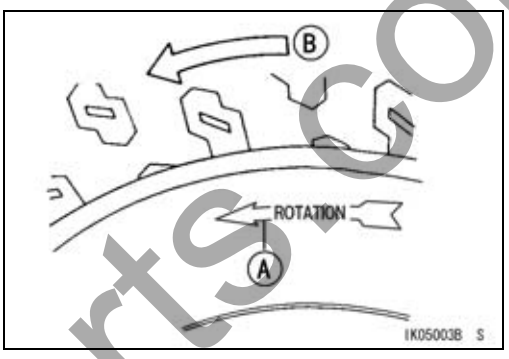
(Figure is the aluminium wheel (KRF750S Model).)

Wheel Installation

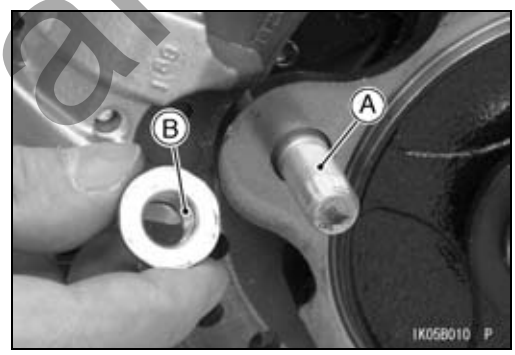
- Check the tire rotation mark [A] on the tire, and install the tire on the rim accordingly.

NOTE

○*The direction of the tire rotation [B] is shown by an arrow on the tire sidewall.*



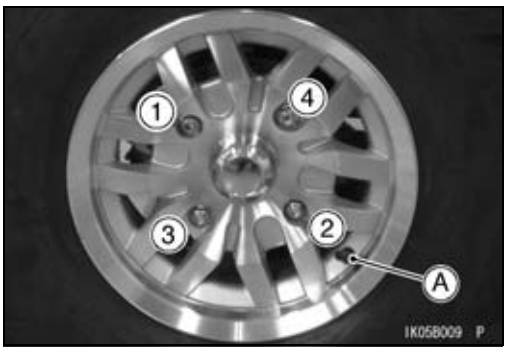
- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Bolt Threads Portion [A]
  Wheel Nut Threads Portion [B]



- Position the wheel so that the air valve [A] is toward the outside of the vehicle.
- Tighten the wheel nuts in a criss-cross pattern.

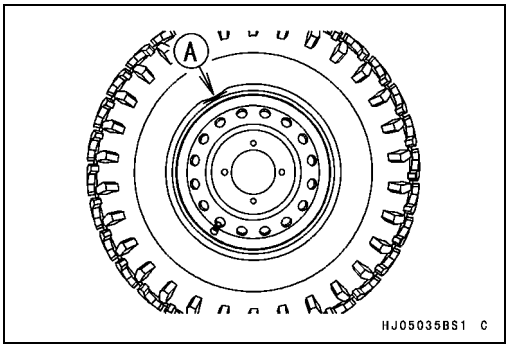
Torque - Wheel Nuts: 110 N·m (11.2 kgf·m, 81 ft·lb)

(Figure is the aluminium wheel (KRF750S Model).)



Wheel (Rim) Inspection

- Examine both sides of the rim for dents [A]. If the rim is dented, replace it.



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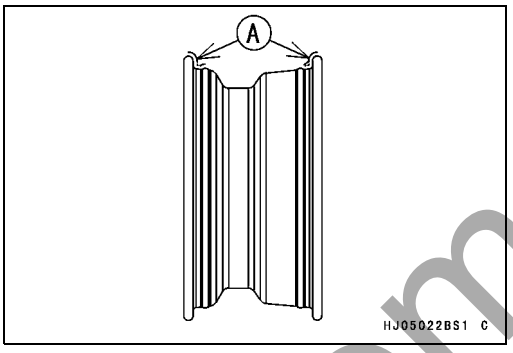
Wheels (Rims)

★If the tire is removed, inspect the air sealing surfaces [A] of the rim for scratches or nicks. Smooth the sealing surfaces with fine emery cloth if necessary.



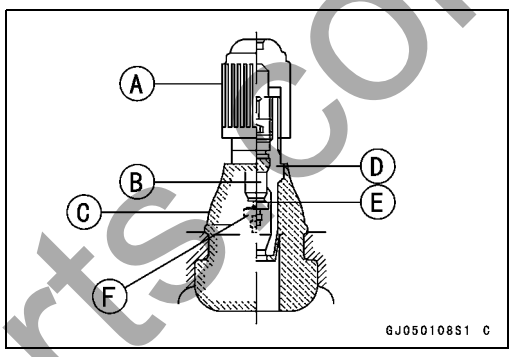
Wheel (Rim) Replacement

- Remove the wheel (see Wheel Removal).
- Disassemble the tire from the rim (see Tire Removal).

○Remove the air valve and discard it.

NOTICE

Replace the air valve whenever the tire is replaced. Do not reuse the air valve.



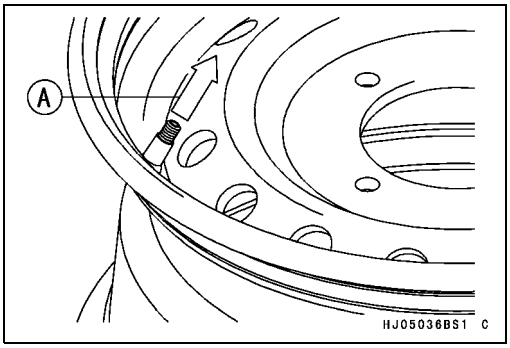
Plastic Cap [A]
Valve Core [B]
Stem Seal [C]
Valve Stem [D]
Valve Seat [E]
Valve Opened [F]

- Install a new air valve in the new rim.

○Remove the valve cap, lubricate the stem with a soap and water solution, and pull [A] the stem through the rim from the inside out until it snaps into place.

NOTICE

Do not use engine oil or petroleum distillates to lubricate the stem because they will deteriorate the rubber.



- Mount the tire on the new rim (see Tire Installation).
- Install the wheel (see Wheel Installation).
- Install the air valve cap.

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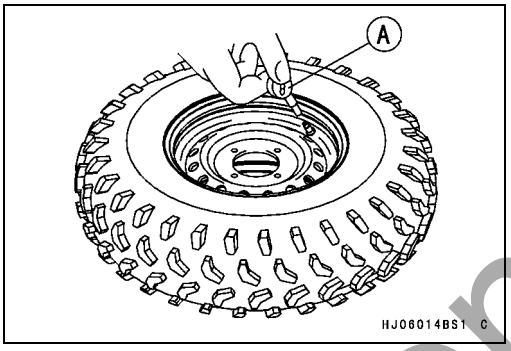
Tires

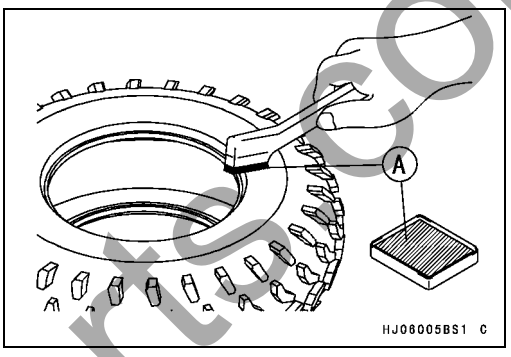
Tire Removal

- Remove the wheel.
- Unscrew the valve core to deflate the tire.

○Use a proper valve core tool [A].



- Lubricate the tire beads and rim flanges on both sides of the wheel with a soap and water solution, or water [A]. This helps the tire beads slip off the rim flanges.



NOTICE

Do not lubricate the tire beads and rim flanges with engine oil or petroleum distillates because they will deteriorate the tire.

- Remove the tire from the rim using a suitable commercially available tire changer.

NOTE

○*The tires cannot be removed with hand tools because they fit the rims tightly.*

Tire Installation

- Inspect the rim (see Wheel (Rim) Inspection).
- Replace the air valve with a new one.

NOTICE

Replace the air valve with whenever the tire is replaced. Do not reuse the air valve.

- Check the tire for wear and damage (see Tire Inspection in the Periodic Maintenance chapter).
- Lubricate the tire beads and rim flanges with a soap and water solution, or water.

⚠ WARNING

Lubricants other than water or a water and soap solution can cause the bead to separate from the rim and cause an accident resulting in serious injury or death. Use only water or a water and soap solution to lubricate the bead when installing the tire.

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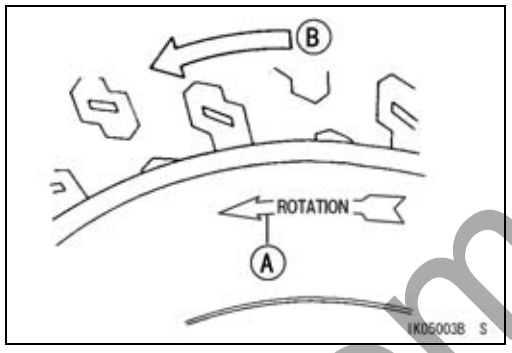
Tires

- Check the tire rotation mark [A] on the tire, and install the tire on the rim accordingly.

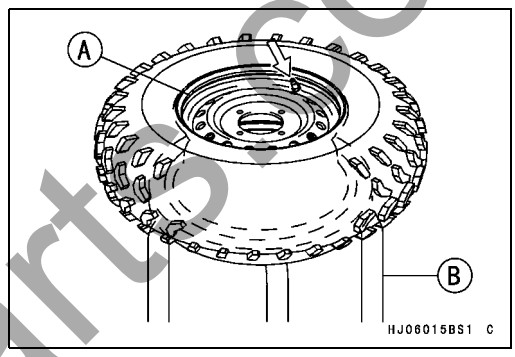
○The tires should be installed on the rims so that each air valve is toward the outside of the vehicle.



NOTE

○*The direction of the tire rotation [B] is shown by an arrow on the tire sidewall.*

- Install the tire on the rim using a suitable commercially available tire changer.
- Lubricate the tire beads again and center the tire on the rim.
- Support the wheel rim [A] on a suitable stand [B] to prevent the tire from slipping off.
- Inflate the tire until the tire beads seat on the rim.



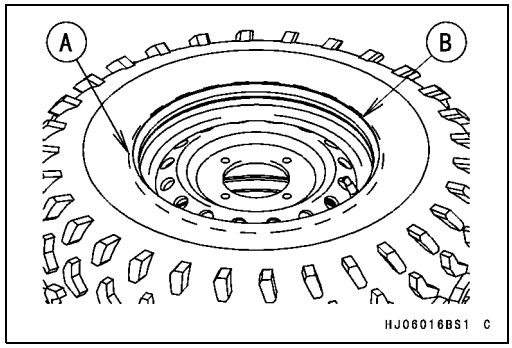
Maximum Tire Air Pressure (to seat beads when cold)
Front and Rear 250 kPa (2.5 kgf/cm², 36 psi)

⚠ WARNING

Overinflating a tire can cause it to explode, causing serious injury or death. Be sure to install the valve core whenever inflating the tire, and do not inflate the tire to more than maximum pressure.

- Check to see that rim lines [A] on both sides of the tire are parallel with the rim flanges [B].

★If the rim lines and the rim flanges are not parallel, deflate the tire, lubricate the sealing surfaces again, and reinflate the tire.



- After the beads are properly seated, check for air leaks.

○Apply a soap and water solution around the tire bead and check for bubbles.

- Deflate the tire to the specified pressure.
- Check the tire pressure using an air pressure gauge.

Tire Air Pressure (when cold)
Front 60 kPa (0.6 kgf/cm², 8.7 psi)
Rear 90 kPa (0.9 kgf/cm², 13.1 psi)

- Install the air valve cap.
- Install the wheel (see Wheel Installation).
- Wipe off the soap and water solution on the tire and dry the tire before operation.

⚠ WARNING

Water or soap solution on the tire bead can cause tire separation and an accident resulting in serious injury or death. Do not operate the vehicle until any water or soap solution applied to the bead has completely dried.

Tire Inspection

- Refer to the Tire Inspection in the Periodic Maintenance chapter.

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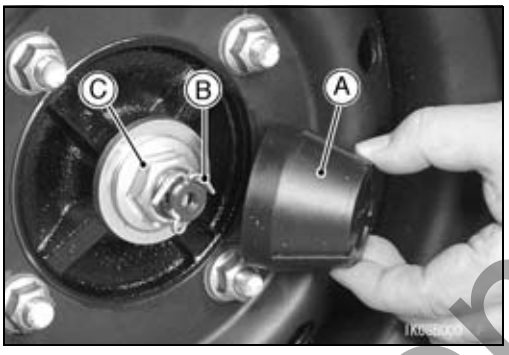
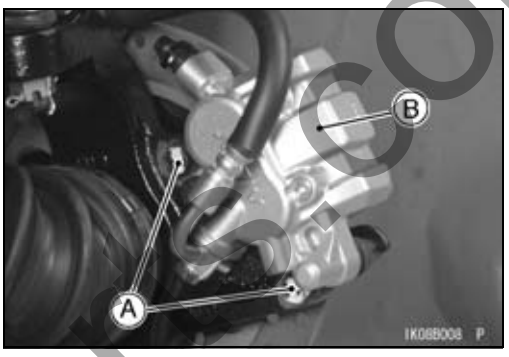
Front Hub

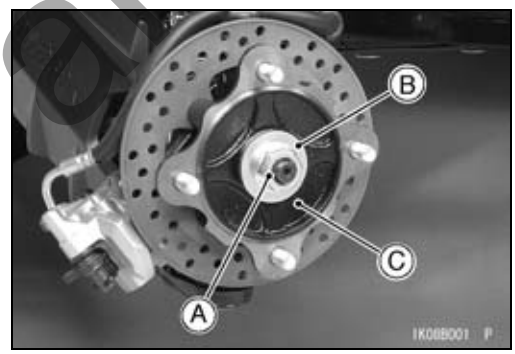
Front Hub Removal



- Remove:
  Cap [A]
  Cotter Pin [B]
- Loosen the axle nut [C], while applying the brake.

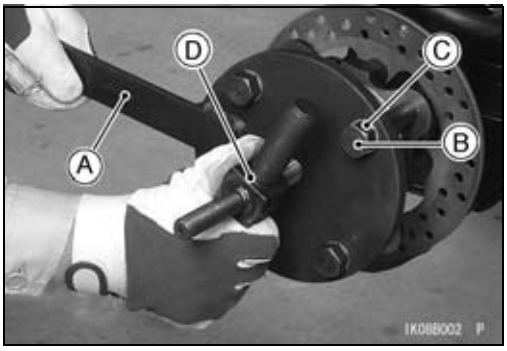


- Remove the front wheel (see Wheel Removal).
- Remove the caliper by taking off the mounting bolts [A], and let the caliper [B] hang free.



- Remove:
  Axle Nut [A] and Washer [B]
  Front Hub [C] with Brake Disc

★If the front hub seems too difficult to remove, use the following special tools.



○Mount the brake drum remover [A] on the hub bolt with the remover nuts [B] and washers [C] (parts in the remover set).

Special Tools - Brake Drum Remover: 57001-1260
Brake Drum Remover Nut: 57001-1326

○Tighten the rotor puller [D], and remove the front hub.

Special Tool - Rotor Puller, M16/M18/M20/M22 × 1.5 : 57001-1216

- Separate the brake disc from the front hub (see Disc Removal in the Brakes chapter).

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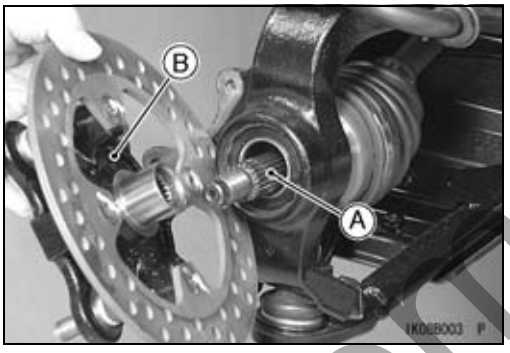
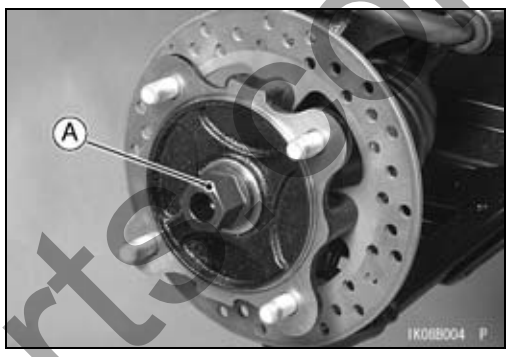
Front Hub

Front Hub Installation



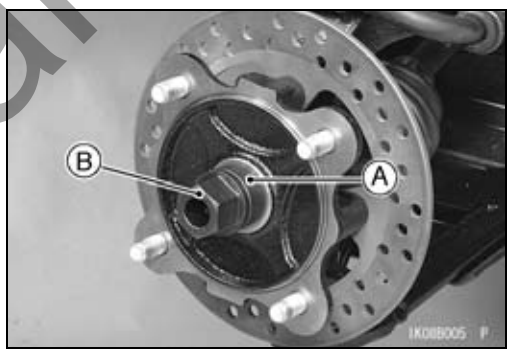
- Install:
  Brake Disc (see Disc Installation in the Brakes chapter)
- Apply grease to the spline [A] of the front axle.
- Install:
  Front Hub [B]

★If the front hub seems too difficult to install, use the following special tool.



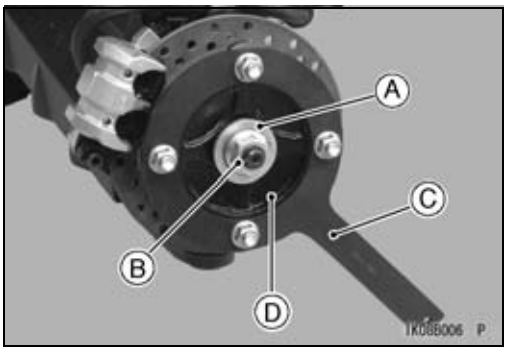
○Using the brake drum pusher [A], and tighten it until the pusher stops.

Special Tool - Brake Drum Pusher: 57001-1714



○Remove the brake drum pusher, and install one spacer [A] in the brake drum pusher set (57001-1709) to the pusher.
○Tighten the hub pusher [B] until the pusher stops.
○Remove the brake drum pusher and spacer.

Special Tool - Brake Drum Pusher & Washer: 57001-1709

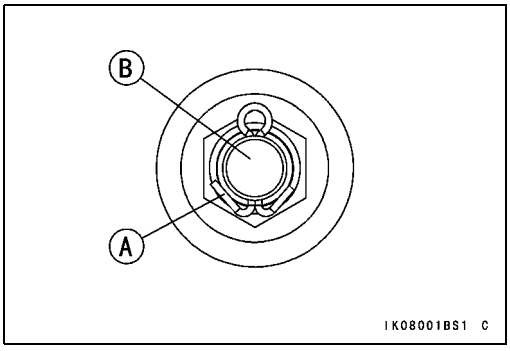


- Install:
  Washer [A]
  Axle Nut [B]
- Using the brake drum holder [C], hold the front hub [D].

Special Tool - Brake Drum Holder: 57001-1325

- Tighten:

Torque - Front Axle Nut: 266 N·m (27.1 kgf·m, 196 ft·lb)



- Insert a new cotter pin [A].
- Bend the cotter pin over the axle shaft end [B] and install the cap.

⚠ WARNING

A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.

- Install:
  Brake Caliper (see Brake Caliper Installation in the Brakes chapter)
  Front Wheels (see Wheel Installation)

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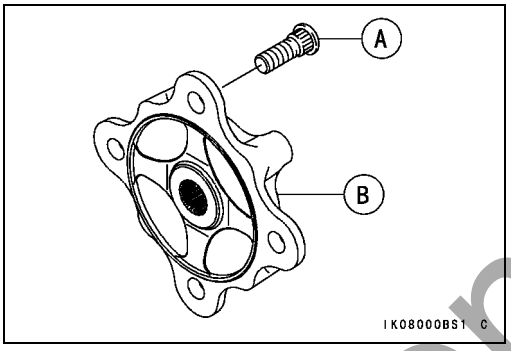
Front Hub

Front Hub Disassembly/Assembly



- Do not remove the hub bolts [A].

★If any hub bolt is damaged, replace the hub [B] and bolts as a unit.

- When installing the hub bolt, press in it using a press.

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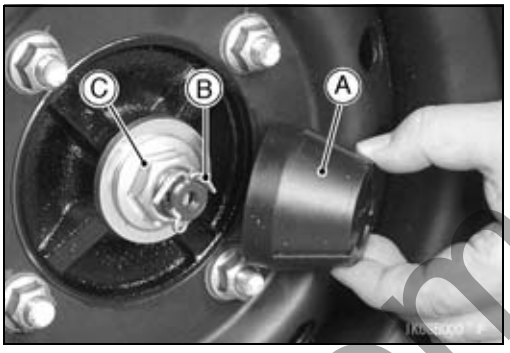
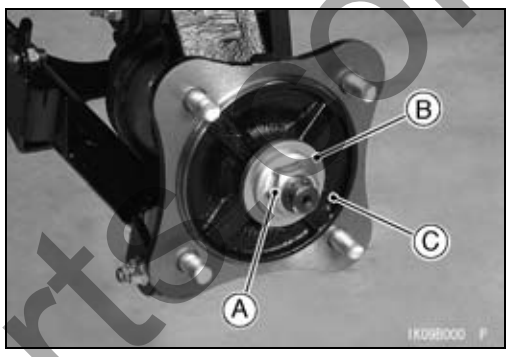
Rear Hub

Rear Hub Removal

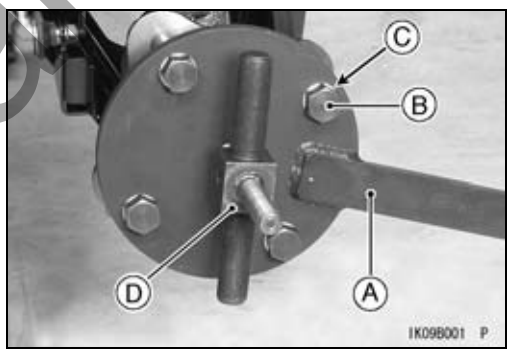


- Remove:
  Cap [A]
  Cotter Pin [B]
- Loosen the axle nut [C], while applying the brake.



- Remove the rear wheel (see Wheel Removal).
- Remove:
  Axle Nut [A] and Washer [B]
  Rear Hub [C]

★If the rear hub seems too difficult to remove, use the following special tools.



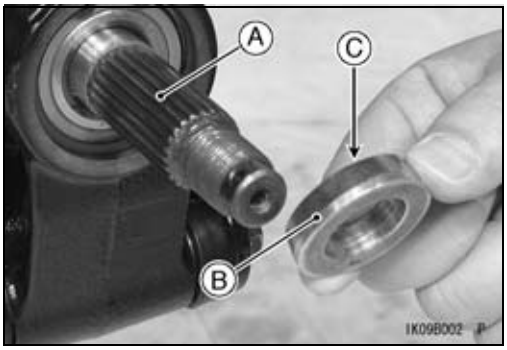
○Mount the brake drum remover [A] on the hub bolt with the remover nuts [B] and washers [C] (parts in the remover set).

Special Tools - Brake Drum Remover: 57001-1260
Brake Drum Remover Nut: 57001-1326

○Tighten the rotor puller [D], and remove the rear hub.

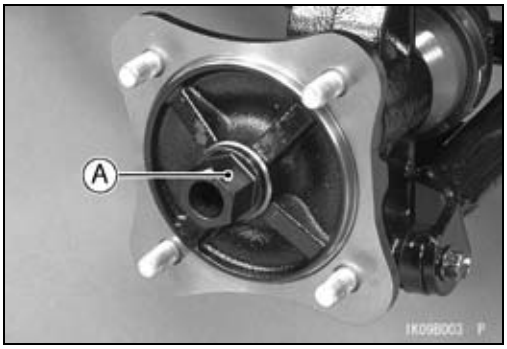
Special Tool - Rotor Puller, M16/M18/M20/M22 × 1.5 : 57001-1216

Rear Hub Installation



- Apply grease to the spline [A] of the rear axle.
- Install the collar [B] so that the small diameter side [C] faces to knuckle.
- Install:
  Rear Hub

★If the rear hub seems too difficult to install, use the following special tool.



○Using the brake drum pusher [A], and tighten it until the pusher stops.

Special Tool - Brake Drum Pusher & Washer: 57001-1709

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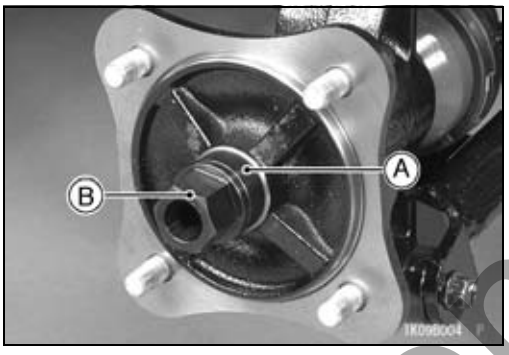
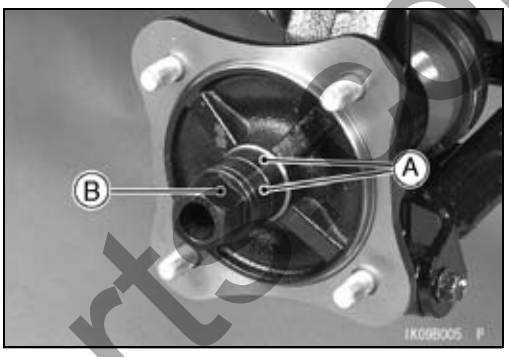
Rear Hub

○Remove the brake drum pusher, and install one spacer [A] in the brake drum pusher set to the pusher.
○Tighten the brake drum pusher [B] until the pusher stops.



○Remove the brake drum pusher, and install two spacers [A] in the brake drum pusher set to the pusher.
○Tighten the brake drum pusher [B] until the pusher stops.
○Remove the brake drum pusher and spacers.

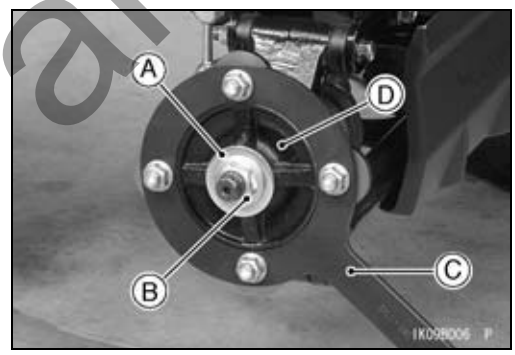


● Install:
Washer [A]
Axle Nut [B]
● Using the brake drum holder [C], hold the rear hub [D].

Special Tool - Brake Drum Holder: 57001-1325

● Tighten:

Torque - Rear Axle Nut: 266 N·m (27.1 kgf·m, 196 ft·lb)

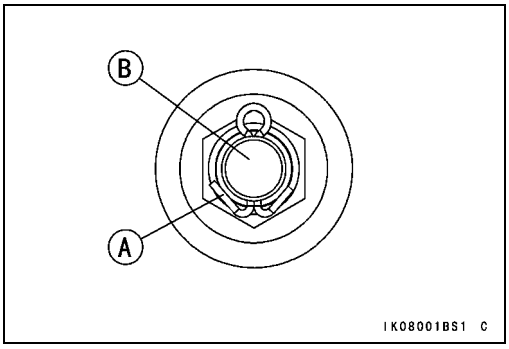


● Insert a new cotter pin [A].
● Bend the cotter pin over the axle shaft end [B] and install the cap.

⚠ WARNING

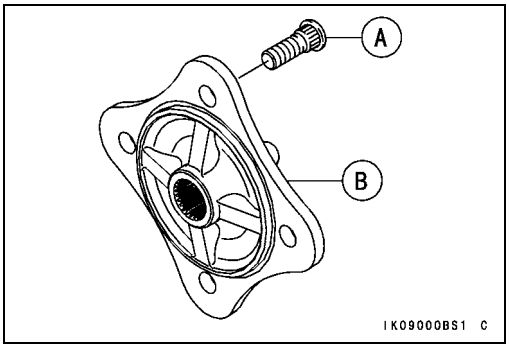
A loose axle nut can lead to an accident resulting in serious injury or death. Tighten the axle nut to the proper torque and install a new cotter pin.

● Install the rear wheel (see Wheel Installation).



Rear Hub Disassembly/Assembly

● Do not remove the hub bolts [A].
★If any hub bolt is damaged, replace the hub [B] and bolts as a unit.
● When installing the hub bolt, press in it using a press.



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Final Drive

Table of Contents

Exploded View 11-3
Specifications 11-10
Special Tools 11-11
Output Bevel Gears 11-13
Output Drive Bevel Gear Removal 11-13
Output Drive Bevel Gear Installation 11-13
Output Drive Bevel Gear Disassembly 11-14
Output Drive Bevel Gear Assembly 11-16
Output Driven Bevel Gear Removal 11-16
Output Driven Bevel Gear Installation 11-17
Output Driven Bevel Gear Disassembly 11-17
Output Driven Bevel Gear Assembly 11-18
Output Bevel Gears Adjustment 11-19
Bevel Gears Inspection 11-23
Front Propeller Shaft 11-24
Front Propeller Shaft Removal 11-24
Front Propeller Shaft Installation 11-24
Front Propeller Shaft Inspection 11-26
Front Axle 11-27
Front Axle Removal 11-27
Front Axle Installation 11-27
Front Axle Joint Boot Inspection 11-27
Front Axle Joint Boot Replacement 11-27
Front Final Gear Case 11-34
Front Final Gear Case Oil Level Inspection 11-34
Front Final Gear Case Oil Change 11-34
Differential Shift Lever Play Inspection 11-34
Differential Shift Lever Play Adjustment 11-34
Differential Shift Lever Removal 11-34
Differential Shift Lever Installation 11-35
Differential Shift Cable Removal 11-35
Differential Shift Cable Installation 11-36
Differential Shift Cable Lubrication 11-37
Differential Shift Cable Inspection 11-37
2WD/4WD Shift Cable Removal 11-37
2WD/4WD Shift Cable Installation 11-38
2WD/4WD Vacuum Actuator Removal 11-39
2WD/4WD Vacuum Actuator Installation 11-40
2WD/4WD Shift Cable Lubrication 11-40
2WD/4WD Shift Cable Inspection 11-41
Front Final Gear Case Removal 11-41
Front Final Gear Case Installation 11-42
Front Final Gear Case Disassembly 11-43
Front Final Gear Case Coupling Inspection 11-46
Front Final Gear Case Assembly 11-47
Ring Gear Disassembly 11-54
Ring Gear Assembly 11-55
LSD Clutch Torque Inspection 11-55
Pinion Gear Unit Disassembly 11-56
Pinion Gear Unit Assembly 11-56

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Front Final Bevel Gear Adjustment 11-57
Front Final Gear Case Backlash Adjustment 11-60
Front Final Gear Case Tooth Contact Adjustment 11-61
Bevel Gear Inspection 11-64
Differential Gear Inspection 11-64
Rear Propeller Shaft 11-65
Rear Propeller Shaft Removal 11-65
Rear Propeller Shaft Installation 11-65
Rear Propeller Shaft Inspection 11-67
Rear Axle 11-68
Rear Axle Removal 11-68
Rear Axle Installation 11-68
Rear Axle Joint Boot Inspection 11-68
Rear Axle Joint Boot Replacement 11-69
Rear Final Gear Case 11-75
Rear Final Gear Case Oil Level Inspection 11-75
Rear Final Gear Case Oil Change 11-75
Rear Final Gear Case Removal 11-75
Rear Final Gear Case Installation 11-77
Rear Final Gear Case Disassembly 11-77
Rear Final Gear Case Right Cover Assembly 11-80
Rear Final Gear Case Front Cover Assembly 11-80
Rear Final Gear Case Assembly 11-81
Pinion Gear Unit Disassembly 11-85
Pinion Gear Unit Assembly 11-86
Rear Final Bevel Gear Adjustment 11-86
Rear Final Gear Case Backlash Adjustment 11-89
Tooth Contact Adjustment 11-90
Bearing and Oil Seal 11-92
Ball or Needle Bearing Inspection 11-92
Oil Seal Inspection 11-93

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Exploded View

Dummy Page

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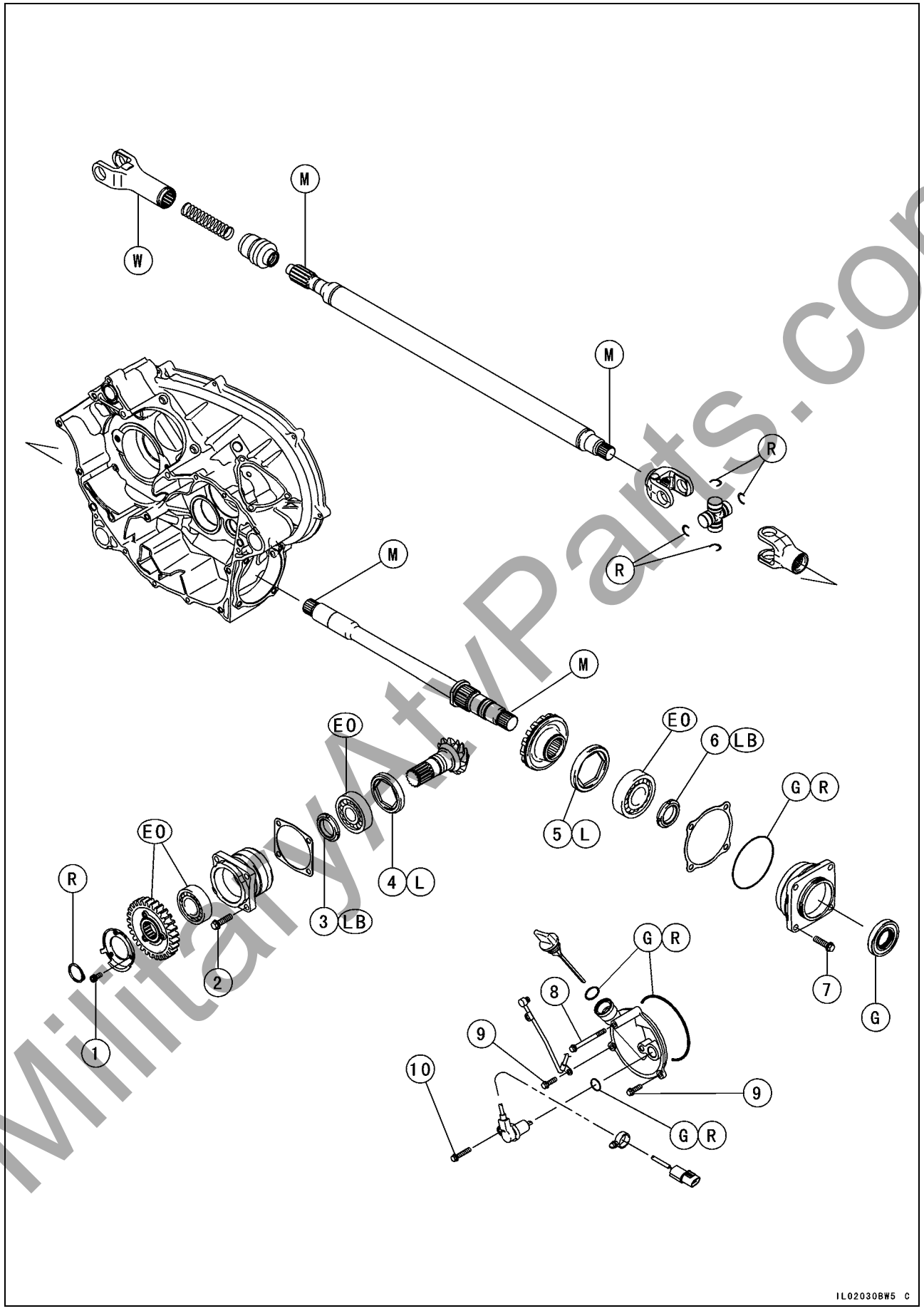
11-4 FINAL DRIVE

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rotor Mounting Bolts	12	1.2	106 in·lb	
2	Output Driven Bevel Gear Housing Bolts	26	2.7	19	
3	Bevel Gear Bearing Holder Nut	200	20.4	148	LB
4	Bearing Holder (M64)	120	12.2	89	L
5	Bearing Holder (M75)	250	25.5	184	L
6	Output Shaft Holder Nut	200	20.4	148	LB
7	Output Drive Bevel Gear Housing Bolts	26	2.7	19	
8	Output Drive Bevel Gear Cover Bolt, L = 65 mm (2.56 in.)	8.8	0.90	78 in·lb	
9	Output Drive Bevel Gear Cover Bolts, L = 20 mm (0.79 in.)	8.8	0.90	78 in·lb	
10	Forward/Reverse Detecting Sensor Mounting Bolt	14.9	1.5	11	

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LB: Apply a non-permanent locking agent (Three Bond TB2471 (Blue)).
M: Apply molybdenum disulfide grease.
R: Replacement Parts
W: Apply soap and water solution.

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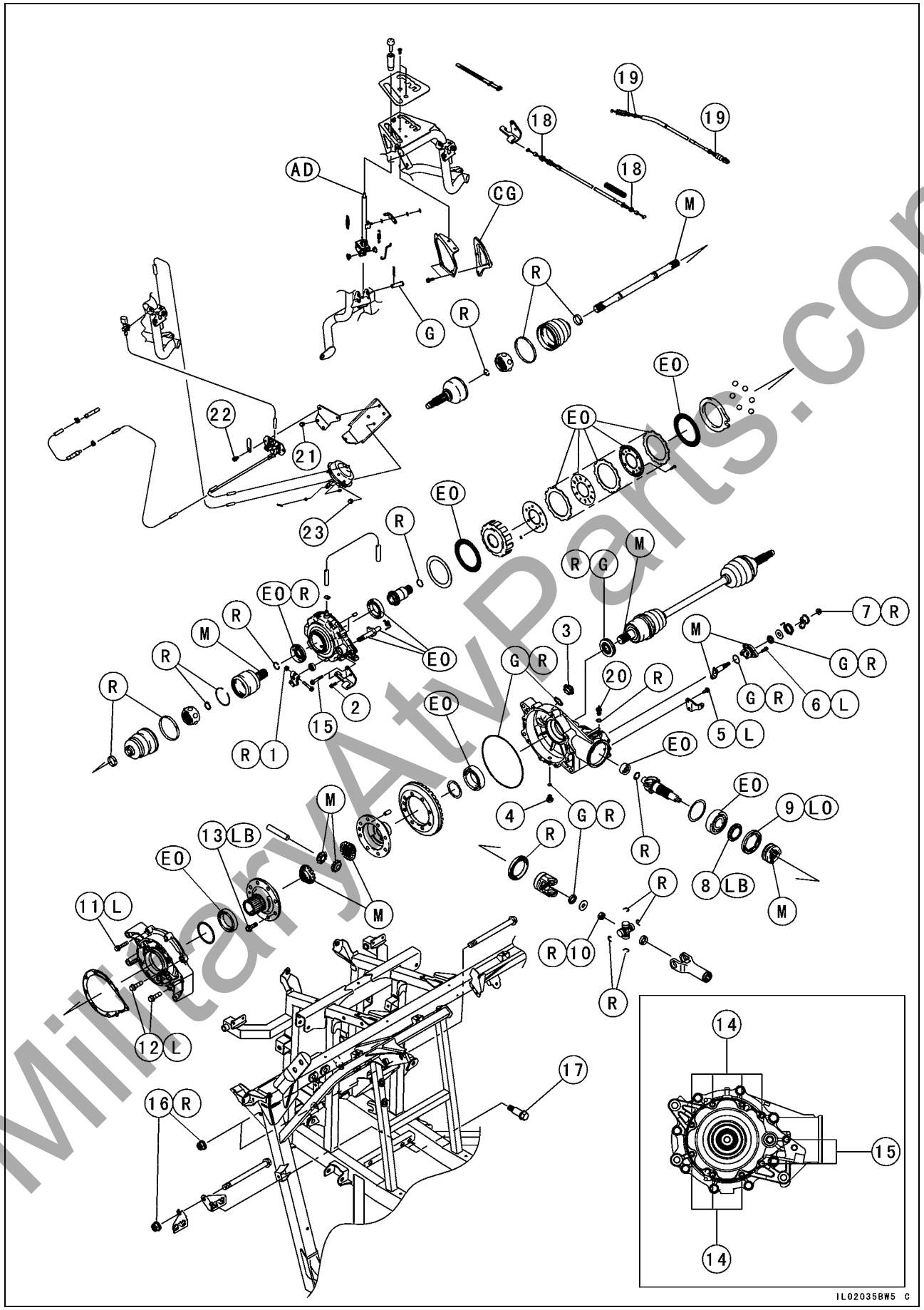
11-6 FINAL DRIVE

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Differential Control Shift Shaft Lever Nut	8.8	0.90	78 in·lb	R
2	Differential Shift Cable Holder Bolt	8.8	0.90	78 in·lb	
3	Front Final Gear Case Oil Filler Cap	29	3.0	21	
4	Front Final Gear Case Oil Drain Plug	15	1.5	11	
5	2WD/4WD Shift Cable Holder Bolts	8.8	0.90	78 in·lb	L
6	2WD/4WD Shift Shaft Cover Bolts	8.8	0.90	78 in·lb	L
7	2WD/4WD Shift Shaft Lever Nut	20	2.0	15	R
8	Pinion Gear Bearing Holder Nut	200	20.4	148	LB
9	Pinion Gear Bearing Holder	250	25.5	184	LO
10	Coupling Nut	35	3.6	26	R
11	Front Final Gear Case Center Cover Bolts (M8)	24	2.4	18	L
12	Front Final Gear Case Center Cover Bolts (M10)	49	5.0	36	L
13	Ring Gear Bolts	57	5.8	42	LB
14	Front Final Gear Case Left Cover Bolts (M6, 35 mm)	8.8	0.90	78 in·lb	
15	Front Final Gear Case Left Cover Bolts (M6, 40 mm)	8.8	0.90	78 in·lb	
16	Front Final Gear Case Mounting Nuts	90.5	9.2	67	R
17	Front Final Gear Case Bracket Bolts	90.5	9.2	67	
18	Differential Shift Cable Locknuts	9.8	1.0	87 in·lb	
19	2WD/4WD Shift Cable Locknuts	4.4	0.45	39 in·lb	
20	4WD Position Switch	15	1.5	11	
21	Vacuum Actuator Bracket Bolts	8.8	0.90	78 in·lb	
22	Solenoid Valve Bracket Bolts	8.8	0.90	78 in·lb	
23	Vacuum Actuator Mounting Bolts	8.8	0.90	78 in·lb	

CG: Apply Chevron Black Pearl Grease EP NLGI 2 or equivalent grease.
EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
LB: Apply a non-permanent locking agent (Three Bond TB2471 (Blue)).
LO: Apply a non-permanent locking agent (Three Bond TB2440B (Orange)).
M: Apply molybdenum disulfide grease.
R: Replacement Parts

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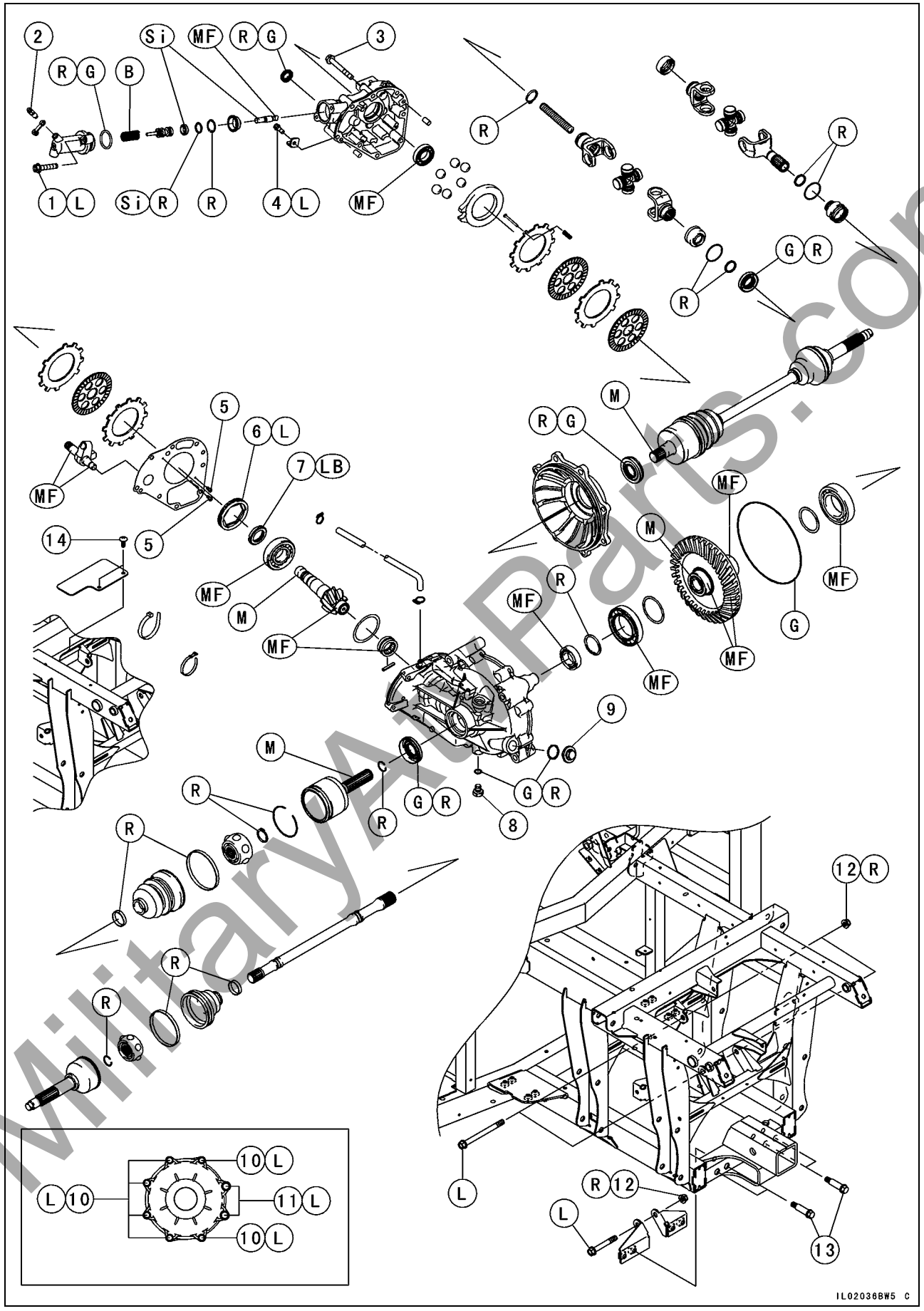
11-8 FINAL DRIVE

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Master Cylinder Mounting Bolts	27	2.8	20	L
2	Rear Master Cylinder Bleed Valve	7.8	0.80	69 in·lb	
3	Rear Final Gear Case Front Cover Bolts	24	2.4	18	
4	Spring Bracket Bolt	8.8	0.90	78 in·lb	L
5	Rear Final Gear Case Gasket Screws	1.3	0.13	12 in·lb	
6	Pinion Gear Bearing Holder	450	45.9	332	L
7	Pinion Gear Bearing Holder Nut	200	20.4	148	LB
8	Rear Final Gear Case Oil Drain Plug	15	1.5	11	
9	Rear Final Gear Case Oil Filler Cap	29	3.0	21	
10	Rear Final Gear Case Right Cover Bolts (M10)	49	5.0	36	L
11	Rear Final Gear Case Right Cover Bolts (M12)	94	9.6	69	L
12	Rear Final Gear Case Mounting Nuts	90.5	9.2	67	R
13	Rear Final Gear Case Bracket Bolts	90.5	9.2	67	
14	Heat Guard Bolts	8.8	0.90	78 in·lb	

G: Apply grease.
L: Apply a non-permanent locking agent.
LB: Apply a non-permanent locking agent (Three Bond TB2471 (Blue)).
M: Apply molybdenum disulfide grease.
MF: Apply gear oil (MOBIL FLUID 424 or equivalent oil).
R: Replacement Parts
Si: Apply silicone grease.

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Specifications

Item	Standard	Service Limit
Output Bevel Gear Case		
Output Bevel Gear Backlash	0.05 ~ 0.11 mm (0.002 ~ 0.004 in.) (at output drive shaft spline)	– – –
Front Final Gear Case		
Gear Case Oil (same engine oil):		
Type	API SG, SH, SJ, SL or SM with JASO MA, MA1 or MA2	– – –
Viscosity	SAE 10W-40	– – –
Oil Level	Filler opening bottom	– – –
Capacity	0.7 L (0.74 US qt)	– – –
Coupling Bushing Inside Diameter	20.000 ~ 20.021 mm (0.7874 ~ 0.7882 in.)	20.051 mm (0.7894 in.)
LSD Clutch Torque:		
When differential shift lever is locked position (5 notches).	300 N·m (31 kgf·m, 221 ft·lb) or more	– – –
Bevel Gear Backlash	0.08 ~ 0.16 mm (0.003 ~ 0.006 in.) (at pinion gear spline)	– – –
Rear Final Gear Case		
Gear Case Oil:		
Type	MOBIL FLUID 424, CITGO TRANSGARD TRACTOR HYDRAULIC FLUID or EXXON HYDRAUL 560	– – –
Oil Level	Filler opening bottom	– – –
Capacity	1.0 L (1.06 US qt)	– – –
Rear Final Bevel Gear Backlash	0.05 ~ 0.11 mm (0.002 ~ 0.004 in.) (at pinion gear spline)	– – –

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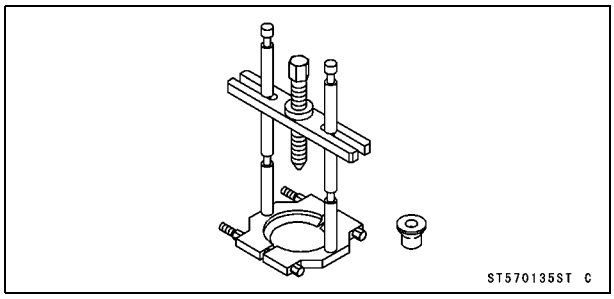
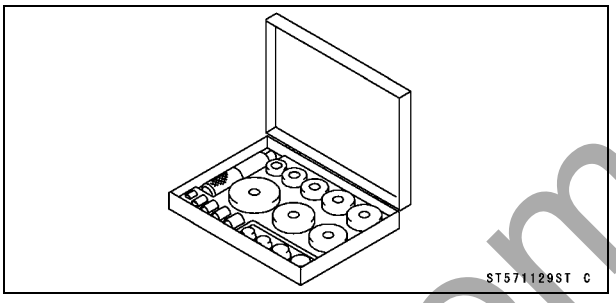
Special Tools

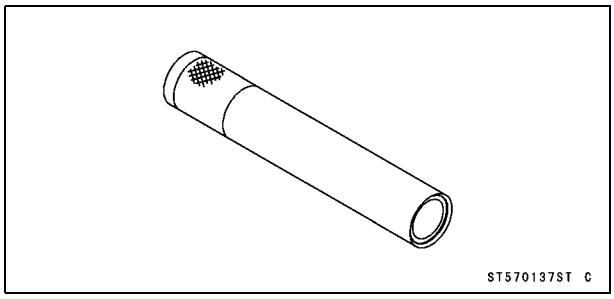
Bearing Puller:
57001-135



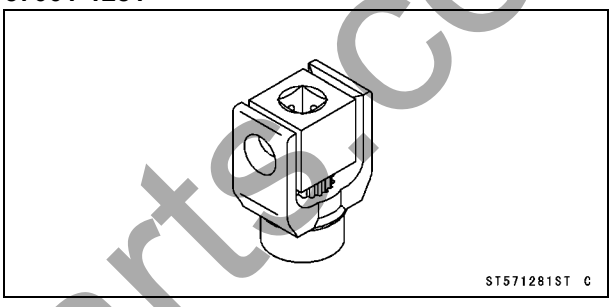
Bearing Driver Set:
57001-1129



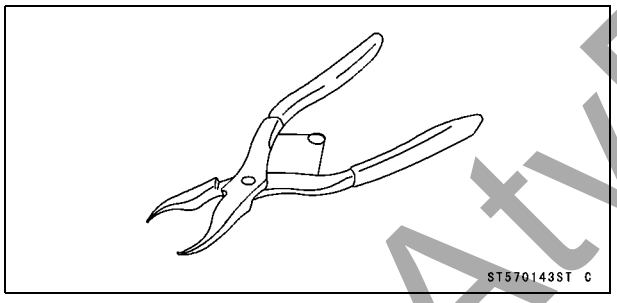
Steering Stem Bearing Driver:
57001-137



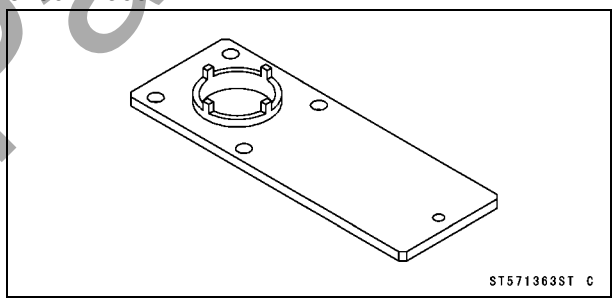
Pinion Gear Holder, m1.0:
57001-1281



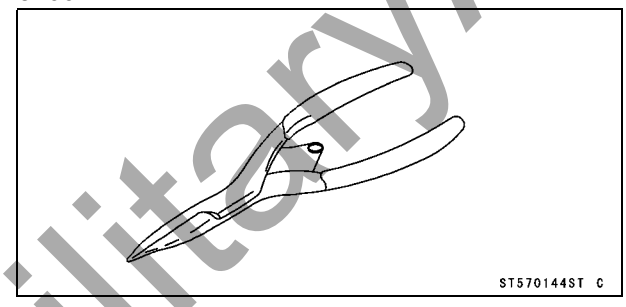
Inside Circlip Pliers:
57001-143



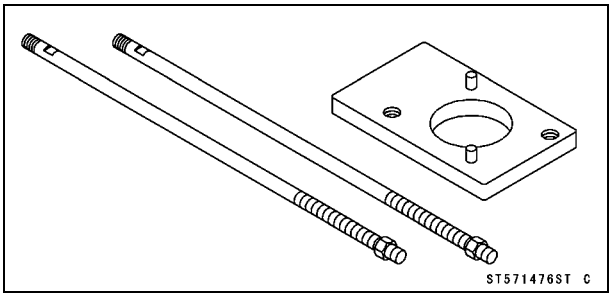
Socket Wrench:
57001-1363



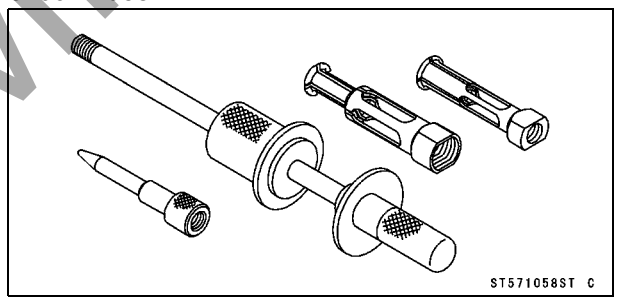
Outside Circlip Pliers:
57001-144



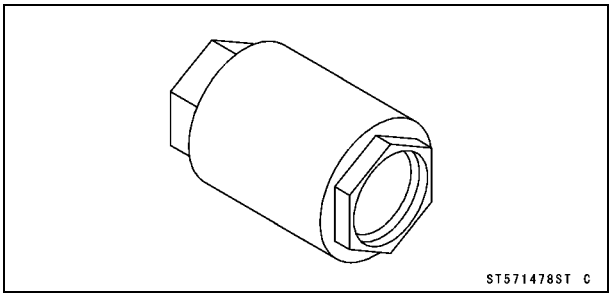
Holder & Guide Arbor:
57001-1476



Oil Seal & Bearing Remover:
57001-1058



Socket Wrench, Hex 50:
57001-1478



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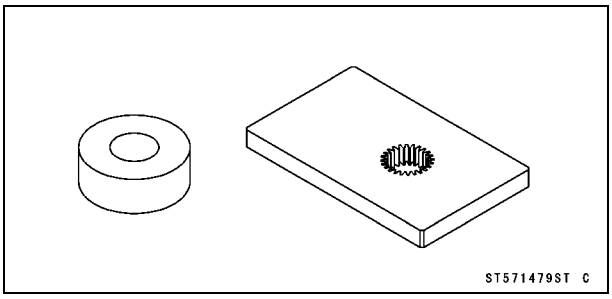
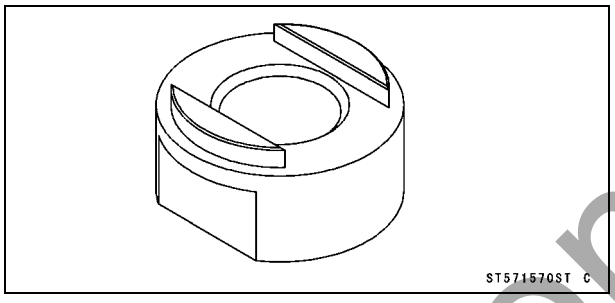
Special Tools

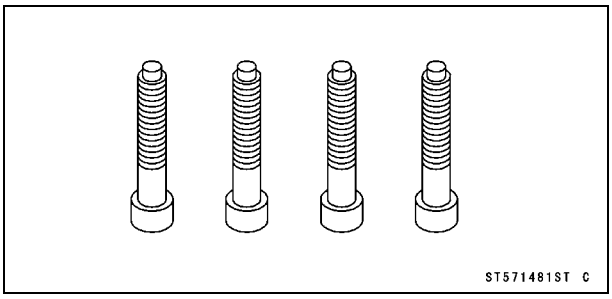
Output Shaft Holder & Spacer, m1.25:
57001-1479



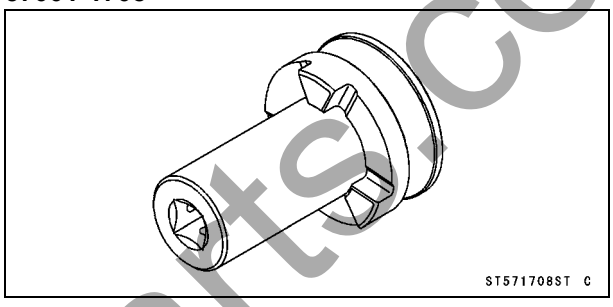
Output Shaft Holder:
57001-1570



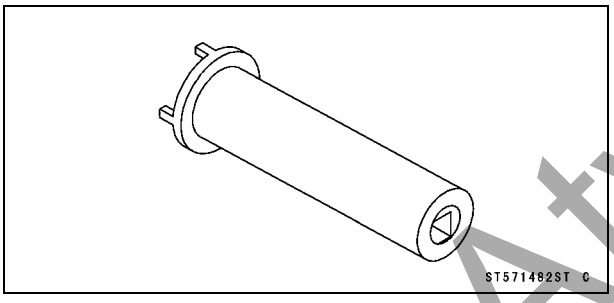
Nut Holding Bolts:
57001-1481



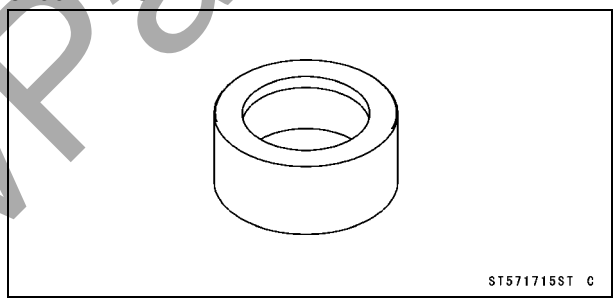
Pinion Gear Holder:
57001-1708



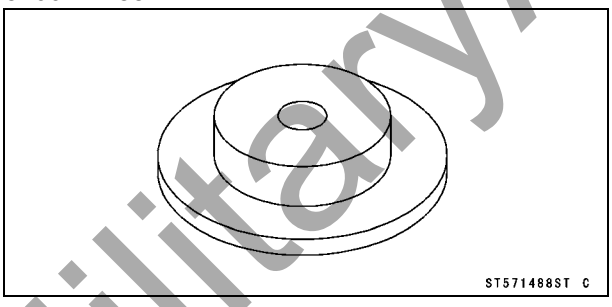
Socket Wrench:
57001-1482



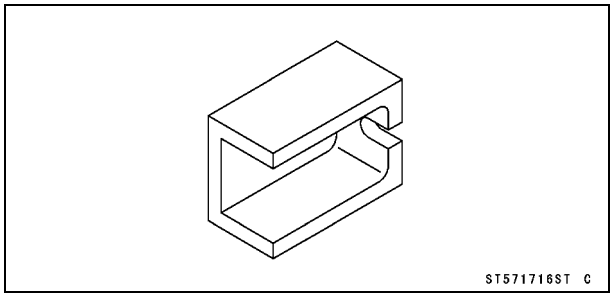
Oil Seal Driver:
57001-1715



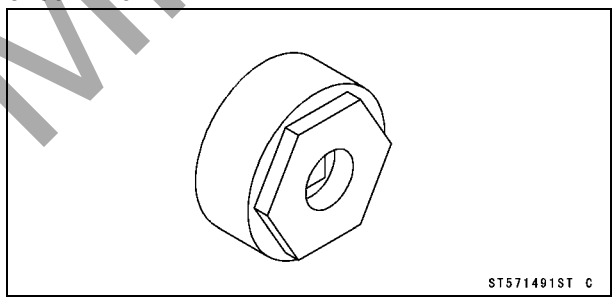
Bearing Driver, ϕ54.3:
57001-1488



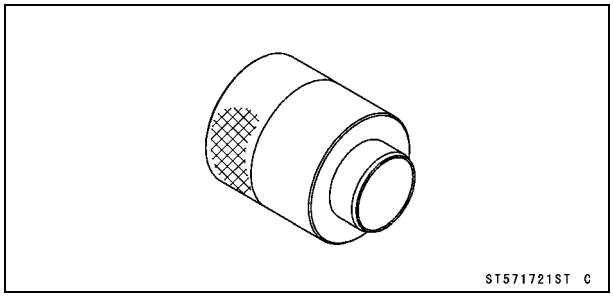
Cable Tension Adjusting Tool:
57001-1716



Hexagon Wench, Hex 41:
57001-1491



Oil Seal Guide:
57001-1721



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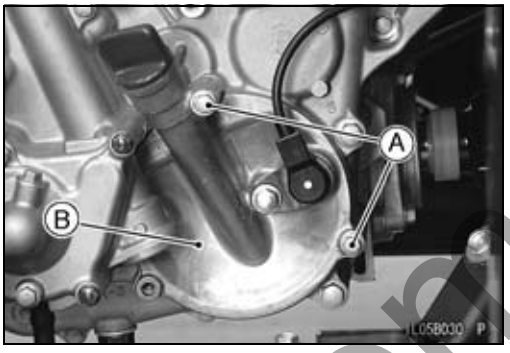
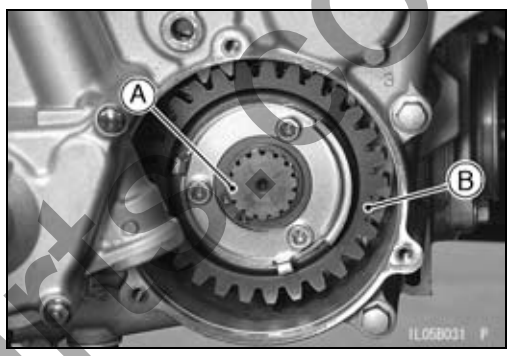
Output Bevel Gears

Output Drive Bevel Gear Removal

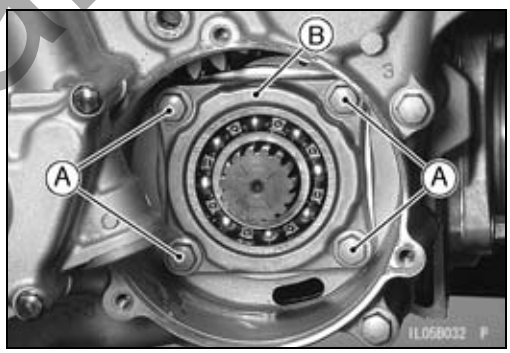


- Remove:
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Left Cover (see Left Cover Removal in the Frame chapter)
  Engine Left Side Oil Pipe (Engine Outside) (see Oil Pipe Removal in the Engine Lubrication System chapter)
  Output Drive Bevel Gear Cover Bolts [A]
  Output Drive Bevel Gear Cover [B]



- Remove:
  Circlip [A]

  Special Tool - Outside Circlip Pliers: 57001-144
- Remove:
  Output Drive Idle Gear [B]

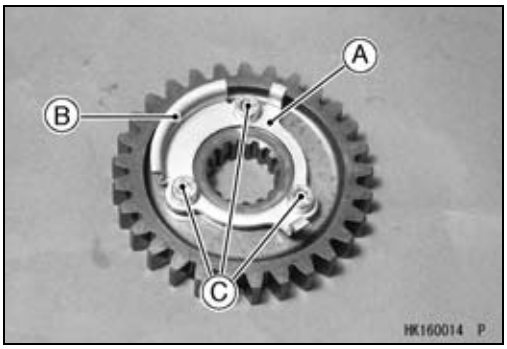


- Remove:
  Output Drive Bevel Gear Housing Bolts [A]
  Output Drive Bevel Gear Housing [B]

Output Drive Bevel Gear Installation

- Install the output drive bevel gear housing.
- Tighten:

  Torque - Output Drive Bevel Gear Housing Bolts: 26 N·m (2.7 kgf·m, 19 ft·lb)



- Install the rotor [A] so that the projections [B] face outward.
- Tighten:

  Torque - Rotor Mounting Bolts [C]: 12 N·m (1.2 kgf·m, 106 in·lb)
- Install:
  Output Drive Idle Gear
  New Circlip

  Special Tool - Outside Circlip Pliers: 57001-144

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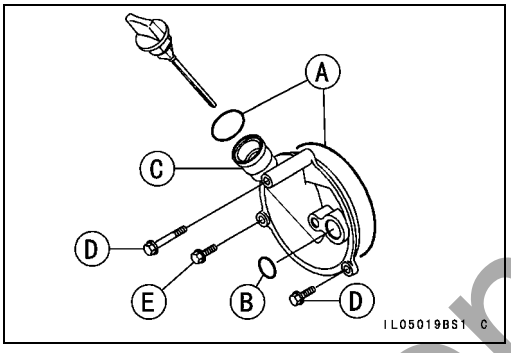
Output Bevel Gears

- Apply grease:
  O-rings [A]
  O-ring [B] (If it is removed.)
- Install:
  Output Drive Bevel Gear Cover [C]
  Engine Left Side Oil Pipe (see Oil Pipe Installation in the Engine Lubrication System chapter)
- Tighten:

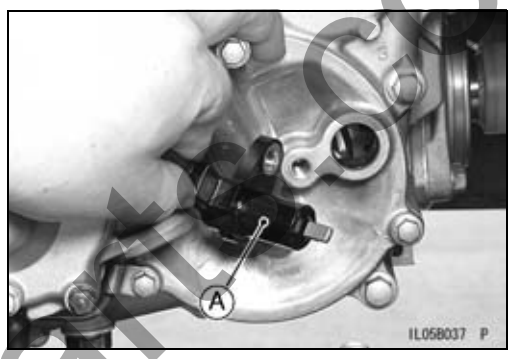
Torque - Output Drive Bevel Gear Cover Bolts [D]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

○Tighten the cover bolt [E] with the oil pipe.



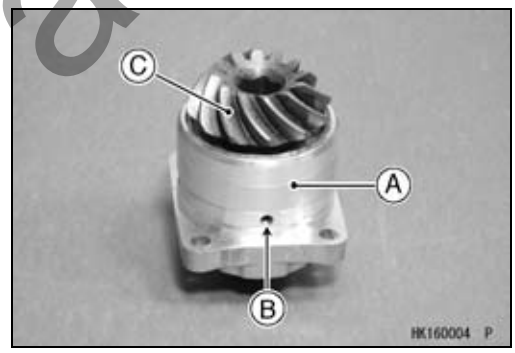
- When installing the forward/reverse detecting sensor [A], install it after the output drive bevel gear cover is installed.
- Tighten:

Torque - Forward/Reverse Detecting Sensor Mounting Bolt: 14.9 N·m (1.5 kgf·m, 11 ft·lb)



Output Drive Bevel Gear Disassembly

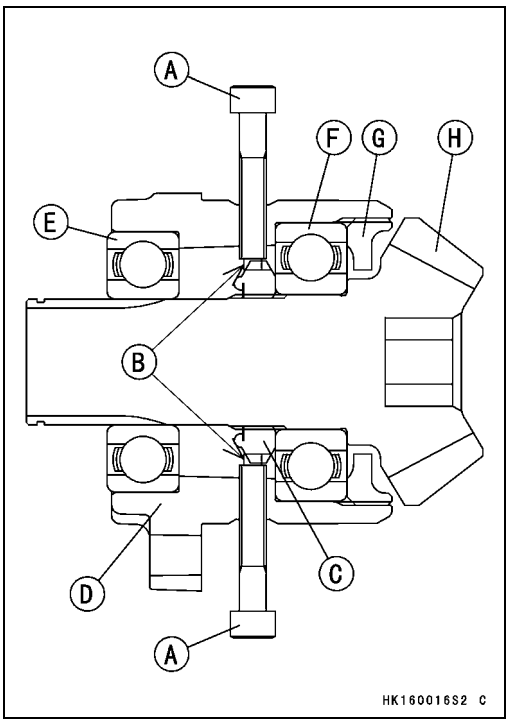
- Remove:
  Output Drive Bevel Gear Housing [A] (see Output Drive Bevel Gear Removal)
- Look through the hole [B] in the housing.
- Turn the bevel gear [C] until the groove of the output drive bevel gear holder nut is seen.



- Tighten the nut holding bolts [A] (4) securely into the grooves [B] of the bevel gear bearing holder nut [C] in the output drive bevel gear housing.

Special Tool - Nut Holding Bolts: 57001-1481

[D] Output Drive Bevel Gear Housing
[E] Outer Ball Bearing
[F] Inner Ball Bearing
[G] Bearing Holder
[H] Output Drive Bevel Gear



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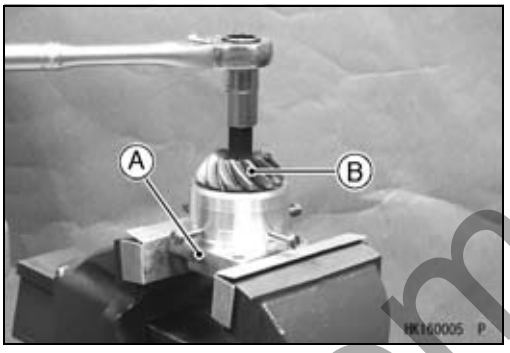
Output Bevel Gears

- Hold the output drive bevel gear housing [A] in a vise.
- Loosen the bevel gear [B] using an Allen wrench about four rotations.
- Remove one nut holding bolt, and look at through the hole.

★If the groove of the bevel gear holder nut is not seen, loosen the other three bolts.



- Drive the gear shaft end using a copper mallet until the grooves of the bearing holder nut can be seen again.
- Retighten the nut holding bolts (4) securely into the groove of the bevel gear holder nut in the output drive bevel gear housing.

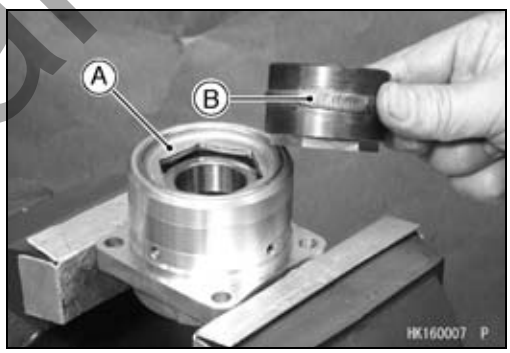
Special Tool - Nut Holding Bolts: 57001-1481

- Repeat the above procedure, and remove the bevel gear from the housing.

- Remove the bearing holder [A] using the hexagon wrench [B].

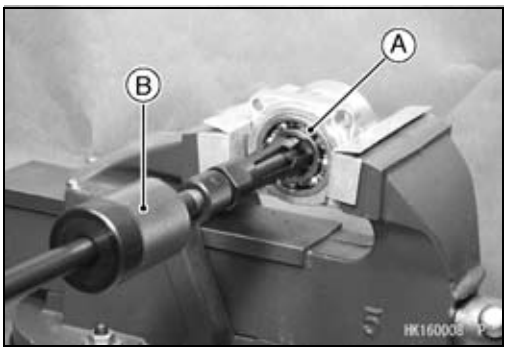
Special Tool - Hexagon Wrench, Hex 41: 57001-1491

○If it is difficult to break free the holder, apply the heat to it to softer the locking agent.



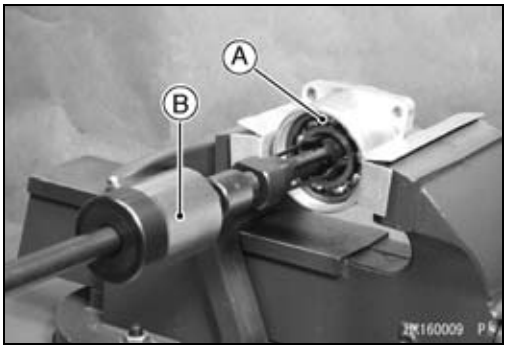
- Remove:
  Outer Ball Bearing [A]

Special Tool - Oil Seal & Bearing Remover [B]: 57001-1058



- Remove:
  Output Drive Bevel Gear Holder Nut
  Inner Ball Bearing [A]

Special Tool - Oil Seal & Bearing Remover [B]: 57001-1058



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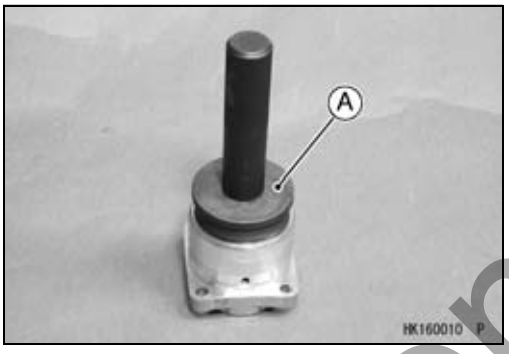
Output Bevel Gears

Output Drive Bevel Gear Assembly

- Press the new inner ball bearing until it is bottomed.

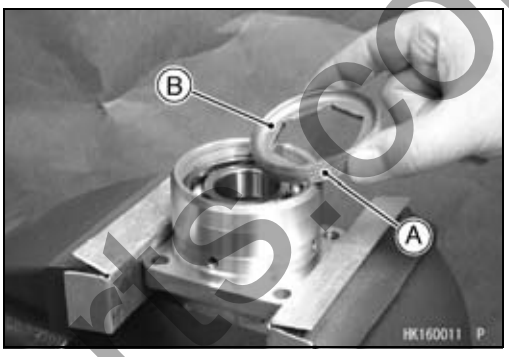
Special Tool - Bearing Driver Set [A]: 57001-1129



- Apply a non-permanent locking agent to the threads of the bearing holder [A] and tighten it so that the deep side [B] faces outward.

Torque - Bearing Holder (M64): 120 N·m (12.2 kgf·m, 89 ft·lb)

- Press the output drive bevel gear until it is bottomed.

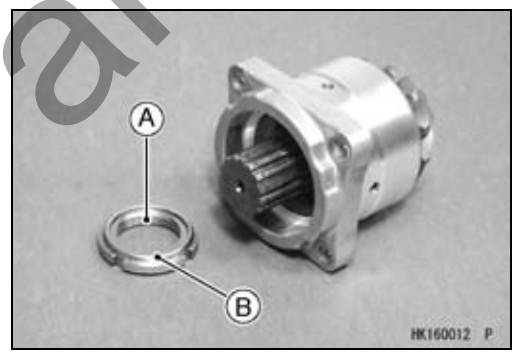


- Apply a non-permanent locking agent (Three Bond: TB2471 Blue) to the threads of the bevel gear bearing holder nut [A] and tighten it so that the projection side [B] faces outward.

Special Tool - Socket Wrench [C]: 57001-1482

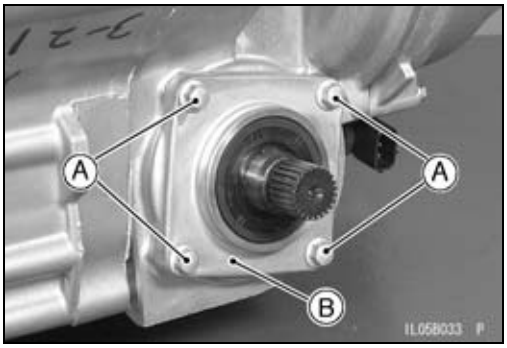
Torque - Bevel Gear Bearing Holder Nut: 200 N·m (20.4 kgf·m, 148 ft·lb)

- Press the new outer ball bearing until it is bottomed.



Output Driven Bevel Gear Removal

- Remove:
  Engine (Engine Removal in the Engine Removal/Installation chapter)
  Output Driven Bevel Gear Housing Bolts [A]
  Output Driven Bevel Gear Housing [B]



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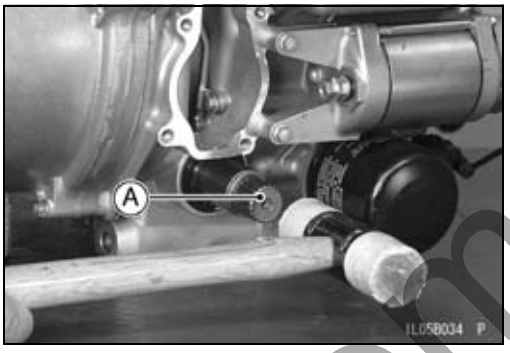
Output Bevel Gears

○Tap lightly the front end [A] of the output driven bevel gear shaft using a plastic mallet.
○The output driven bevel gear shaft assembly comes off with the housing.



Output Driven Bevel Gear Installation

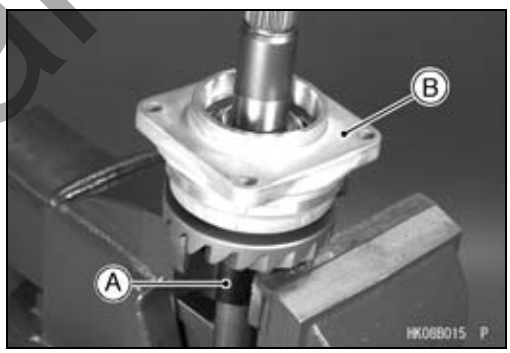
- Apply grease:
  O-ring [A]
- Install the output driven bevel gear shaft assembly.
- Tighten:

Torque - Output Driven Bevel Gear Housing Bolts: 26 N·m (2.7 kgf·m, 19 ft·lb)

Output Driven Bevel Gear Disassembly

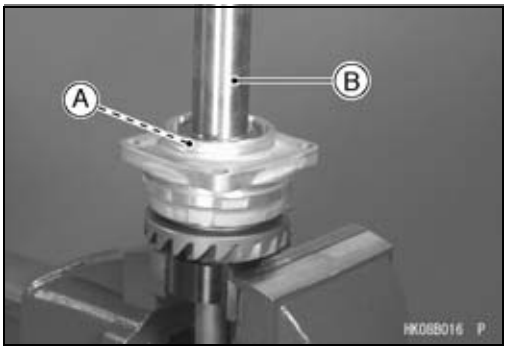
- Remove:
  Output Driven Bevel Gear Housing Assembly (see Output Driven Bevel Gear Removal)
  Oil Seal
- Hold the output shaft holder [A] in a vise, and set the housing assembly [B] on the holder.

Special Tool - Output Shaft Holder: 57001-1570

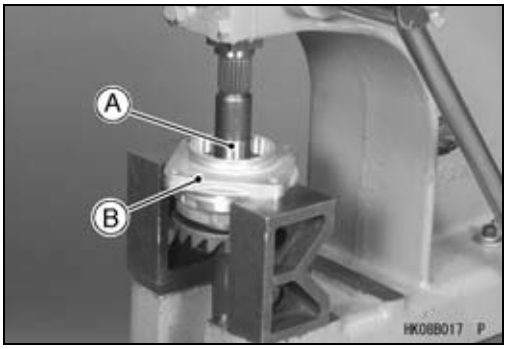


- Remove:
  Output Shaft Holder Nut [A]

Special Tool - Socket Wrench [B]: 57001-1482



- Remove the output shaft [A] from the housing [B] using a press.



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Output Bevel Gears

- Hold the housing assembly [A] with the holder [B] in a vise.

  Special Tool - Holder & Guide Arbor: 57001-1476

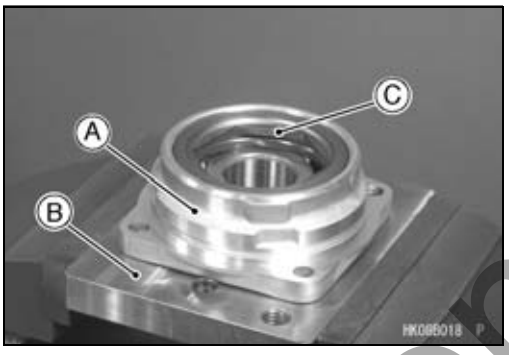
- Remove:
  Bearing Holder [C]

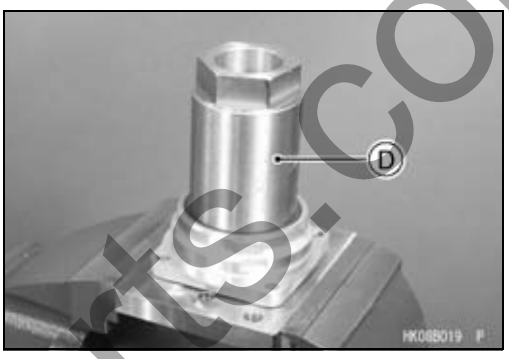
  Special Tool - Socket Wrench, Hex 50 [D]: 57001-1478

○If the holder seems too difficult to break free, apply heat to softer the locking agent.

- Remove:
  Ball Bearing

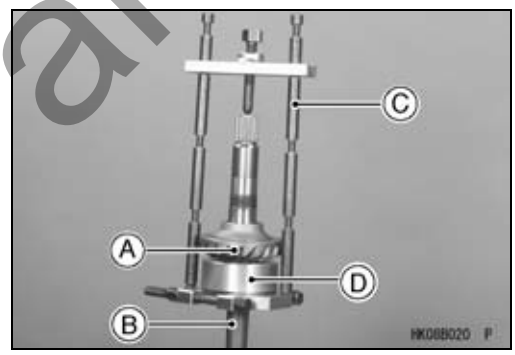
  Special Tool - Oil Seal & Bearing Remover: 57001-1058





- Remove the output driven bevel gear [A] from the output shaft [B] using the bearing puller [C] and spacer [D].

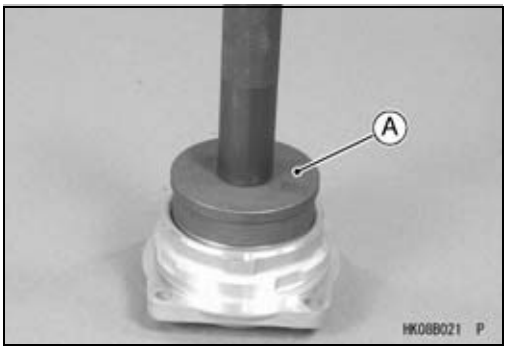
  Special Tools - Bearing Puller: 57001-135
  Output Shaft Holder & Spacer, m1.25: 57001 -1479



Output Driven Bevel Gear Assembly

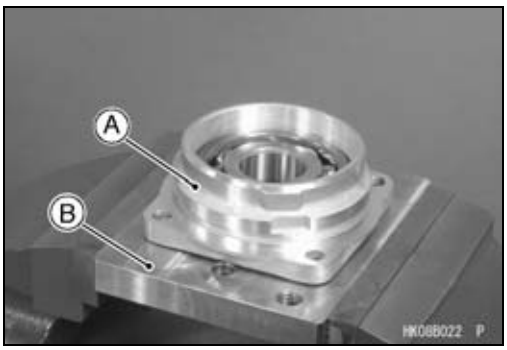
- Press the new ball bearing until it is bottomed.

  Special Tool - Bearing Driver Set [A]: 57001-1129



- Hold the housing assembly [A] with the holder [B] in a vise.

  Special Tool - Holder & Guide Arbor: 57001-1476



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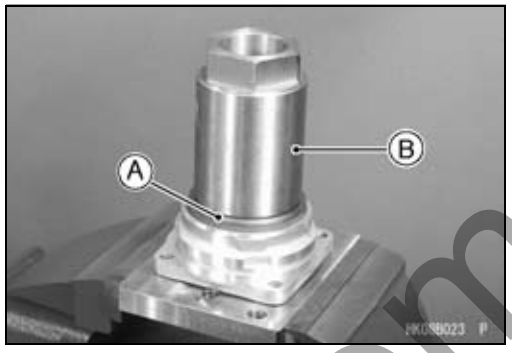
Output Bevel Gears

- Apply a non-permanent locking agent to the threads of the bearing holder [A] and tighten it.

  Special Tool - Socket Wrench, Hex 50 [B]: 57001-1478

  Torque - Bearing Holder (M75): 250 N·m (25.5 kgf·m, 184 ft·lb)

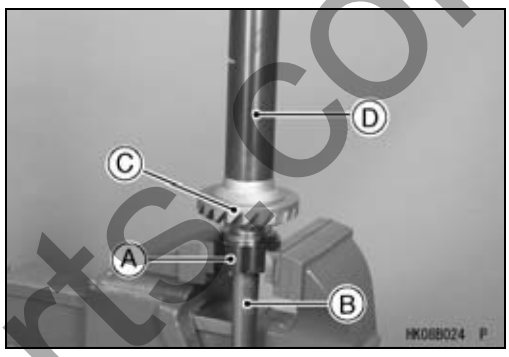


- Hold the output shaft holder [A] in a vise, and set the output shaft [B] on the holder.

  Special Tool - Output Shaft Holder: 57001-1570

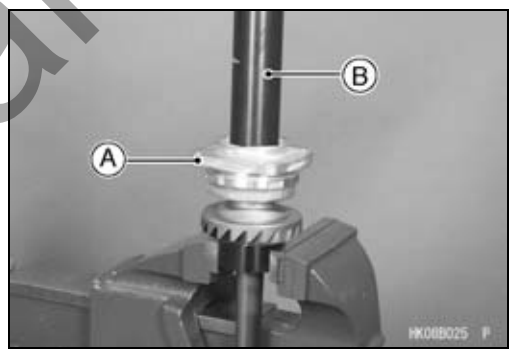
- Press the output driven bevel gear [C] using the steering stem bearing driver [D] until it is bottomed.

  Special Tool - Steering Stem Bearing Driver: 57001-137



- Press the housing assembly [A] using the steering stem bearing driver [B] until it is bottomed.

  Special Tool - Steering Stem Bearing Driver: 57001-137

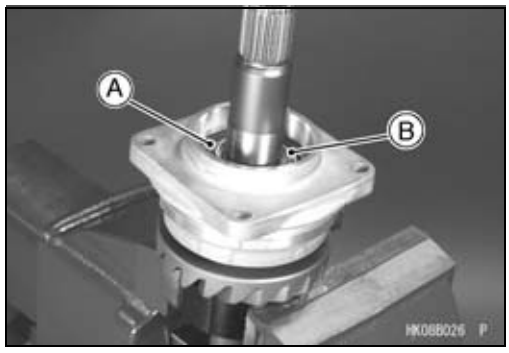


- Apply a non-permanent locking agent (Three Bond : TB2471 Blue) to the threads of the output shaft holder nut [A] and tighten it so that the projection side [B] faces outward.

  Special Tool - Socket Wrench: 57001-1482

  Torque - Output Shaft Holder Nut: 200 N·m (20.4 kgf·m, 148 ft·lb)

- Apply grease to the oil seal and press it so that it is flush with the end surface of the housing.

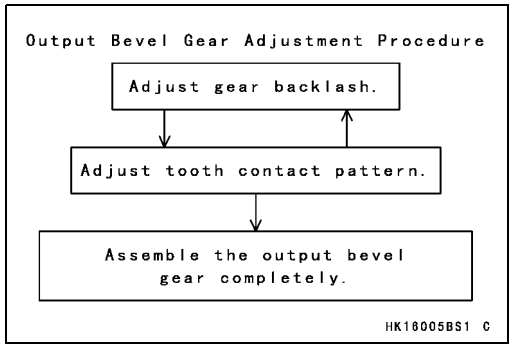


Output Bevel Gears Adjustment

The **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

When replacing any one of the backlash-related parts, be sure to check and adjust the backlash and tooth contact. First adjust the backlash, and then tooth contact by replacing shims.

These two adjustments are of critical importance and must be carried out in the correct sequence, using the procedures shown.


Output Bevel Gear Adjustment Procedure
Adjust gear backlash.
Adjust tooth contact pattern.
Assemble the output bevel gear completely.
HK18005BS1 C

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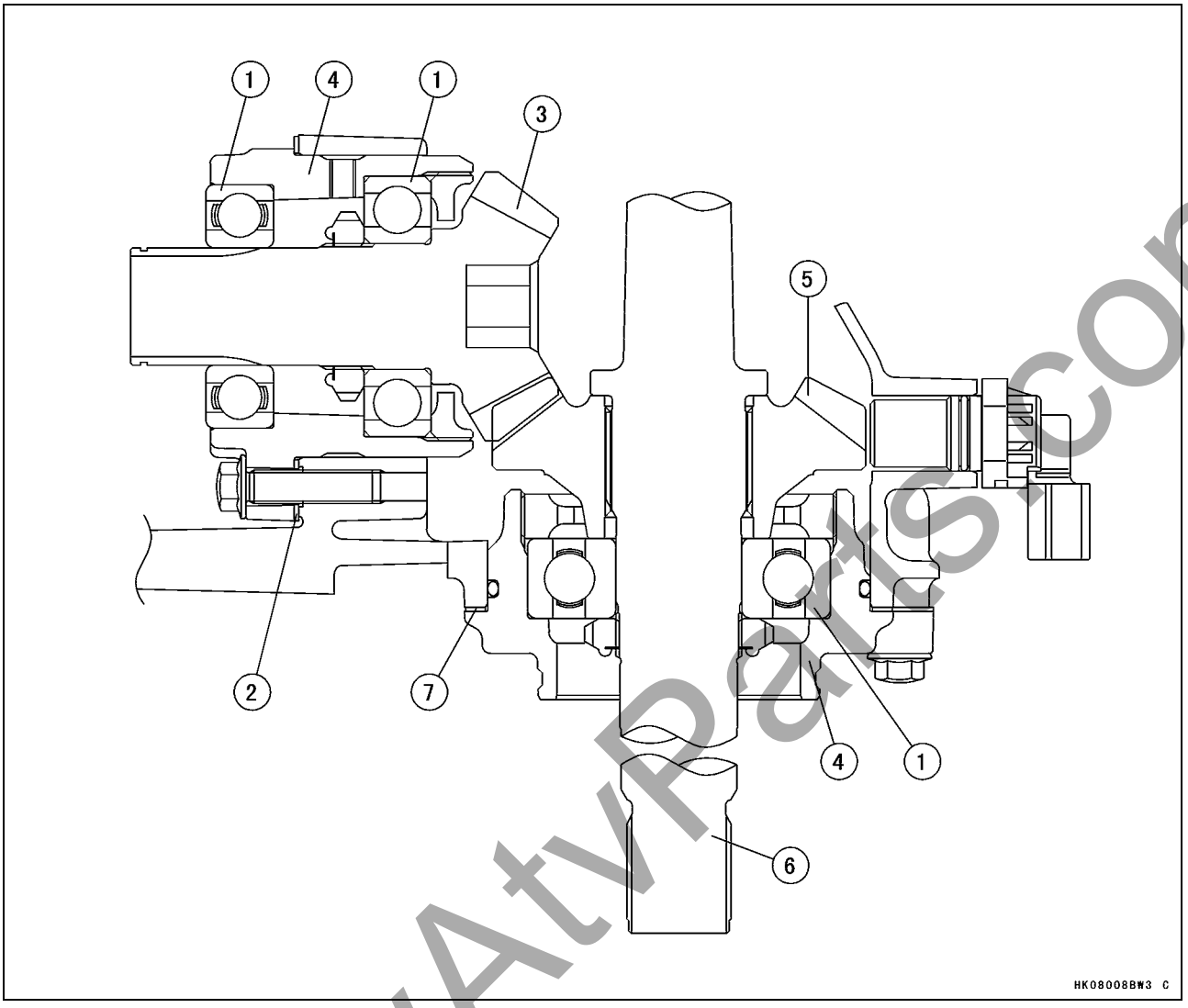
Output Bevel Gears

Output Bevel Gear (Backlash-related Parts)



1. Ball Bearings
2. Drive Bevel Gear Shims
3. Output Drive Bevel Gear
4. Bearing Housings
5. Output Driven Bevel Gear
6. Output Driven Shaft
7. Driven Bevel Gear Shims

Drive Bevel Gear Shims for Tooth Contact Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1311
0.2 mm (0.008 in.)	92180-1312
0.5 mm (0.020 in.)	92180-1313
0.8 mm (0.031 in.)	92180-1314
1.0 mm (0.039 in.)	92180-1351
1.2 mm (0.047 in.)	92180-1352

Driven Bevel Gear Shims for Backlash Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1307
0.2 mm (0.008 in.)	92180-1308
0.5 mm (0.020 in.)	92180-1309
0.8 mm (0.031 in.)	92180-1310
1.0 mm (0.039 in.)	92180-1349
1.2 mm (0.047 in.)	92180-1350

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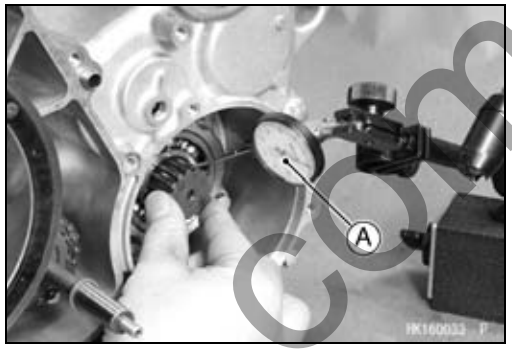
Output Bevel Gears

Bevel Gear Backlash Adjustment

○The amount of backlash is influenced by driven bevel gear position more than by drive bevel gear position.

● Remove the output drive idle gear (see Output Drive Bevel Gear Removal).

● Set up a dial gauge [A] against the output drive shaft spline groove to check gear backlash.



○To measure the backlash, turn the shaft clockwise and counterclockwise slightly so as not to move the mate gear. The difference between the highest and lowest gauge reading is the amount of backlash.

★If the backlash is not within the limit, replace the shim(s) at the driven bevel gear.

★Change the thickness a little at a time.

● Recheck the backlash, and readjust as necessary.

Output Bevel Gear Backlash
Standard: 0.05 ~ 0.11 mm (0.002 ~ 0.004 in.)
(at output drive shaft spline)

Tooth Contact Adjustment

○Tooth contact location is influenced by drive gear position more than by driven gear position.

● Clean any dirt and oil off the bevel gear teeth.

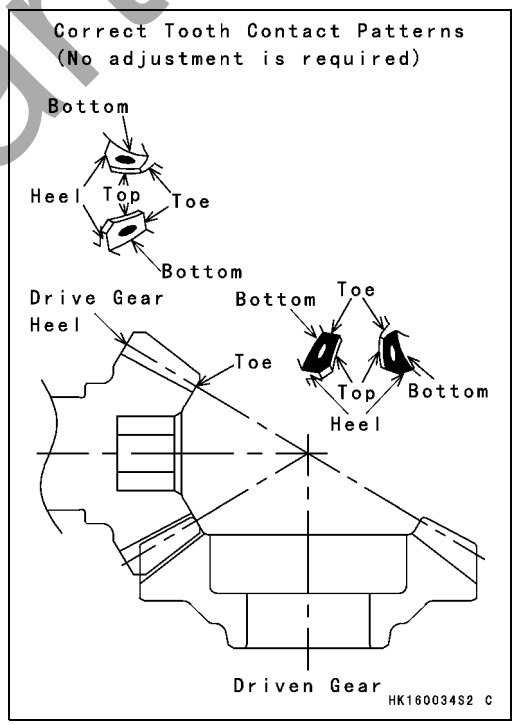
● Apply checking compound to 4 or 5 teeth on the output driven bevel gear.

NOTE

○*Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*

○*The checking compound must be smooth and firm with the consistency of tooth paste.*

○*Special compounds are available at automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use this for checking the bevel gears.*



● Turn the output driven shaft for 3 or 4 turns in the drive and reverse (coast) directions, while creating a drag on the drive bevel gear shaft.

● Check the drive pattern and coast pattern of the bevel gear teeth. The tooth contact patterns of both drive and coast sides should be centrally located between the top and bottom of the tooth, and a little closer to the toe of the tooth.

★If the tooth contact pattern is incorrect, replace the shim(s) at the drive bevel gear and shim(s) at the driven bevel gear, following the examples shown. Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shims are replaced. Repeat the shim change procedure as necessary.

NOTE

○*If the backlash is out of the standard range after changing shims, correct the backlash before checking the tooth contact pattern.*

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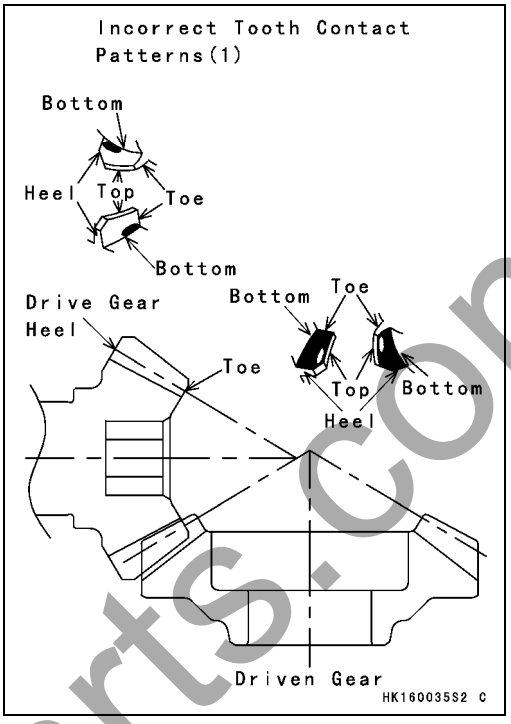
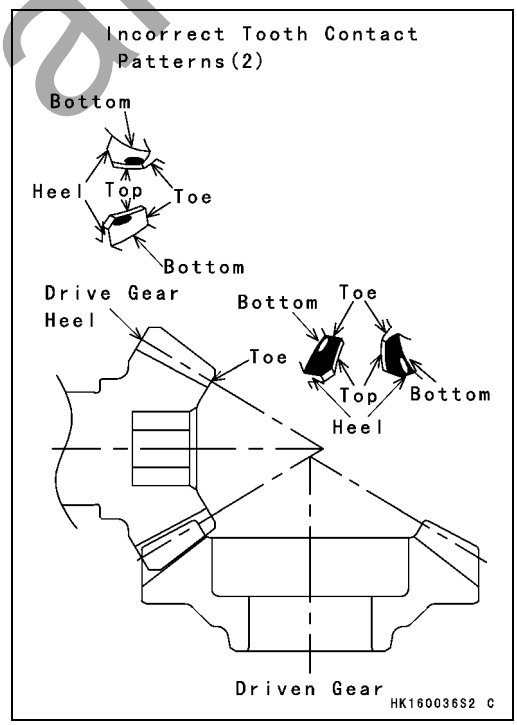
Output Bevel Gears

Example 1: Decrease the thickness of the drive bevel gear shim(s) by 0.1 mm (0.004 in.), and/or increase the thickness of the driven bevel gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



Example 2: Increase the thickness of the drive bevel gear shim(s) by 0.1 mm (0.004 in.), and/or decrease the thickness of the driven bevel gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



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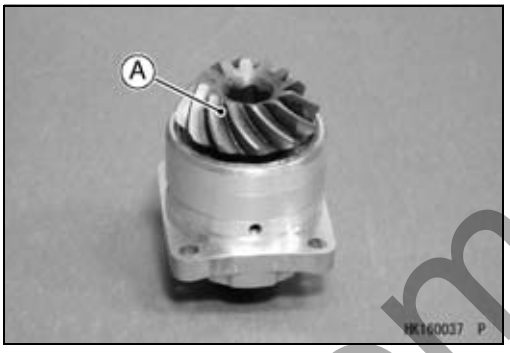
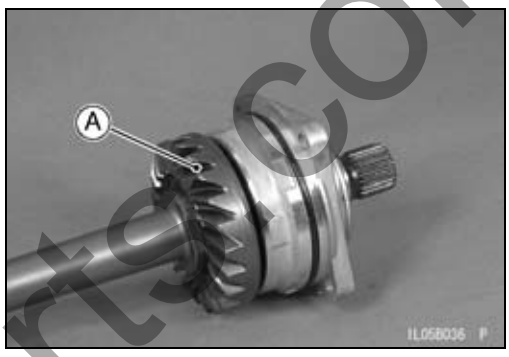
Output Bevel Gears

Bevel Gears Inspection





- Visually check the bevel gears [A] for scoring, chipping, or other damage.

★Replace the bevel gears as a set if either gear is damaged.

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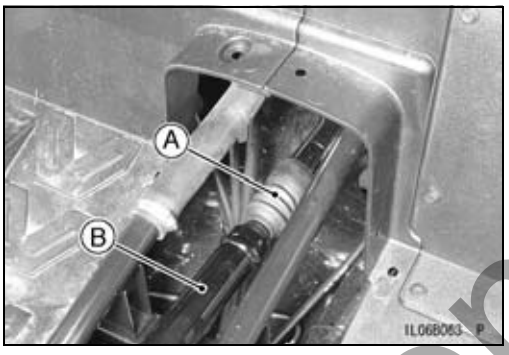
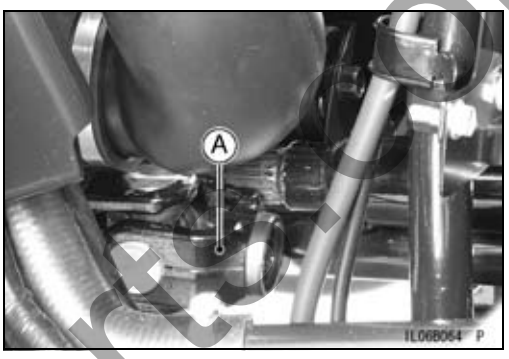
Front Propeller Shaft

Front Propeller Shaft Removal



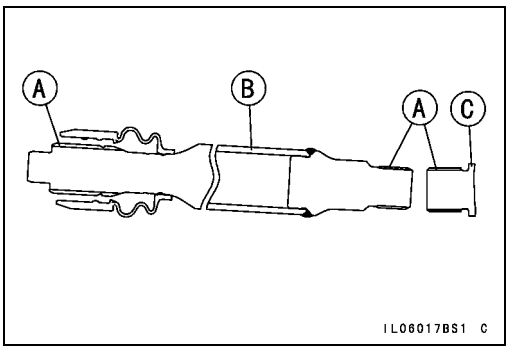
- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
- Move the rubber boot [A] rearward.
- Push the front propeller shaft [B] forward, and remove the rear end from the universal joint.
- Remove the front propeller shaft and spring from the vehicle.



- Remove:
  Universal Joint [A]

Front Propeller Shaft Installation

- Wipe off any old grease on the splines of the following parts.
  Universal Joint of Front Final Gear Case
  Propeller Shaft
  Universal Joint
  Output Bevel Gear Shaft



- Apply molybdenum disulfide grease to the splines [A] of the propeller shaft [B] and output bevel gear shaft [C].

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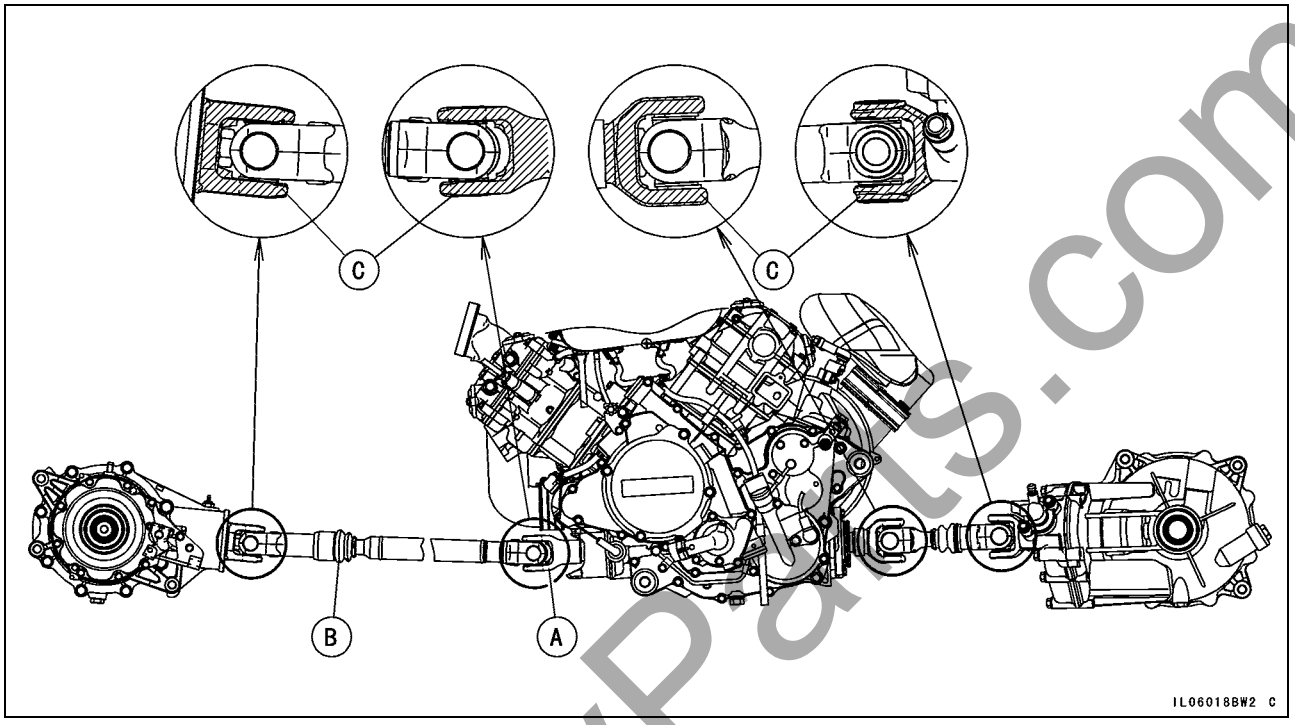
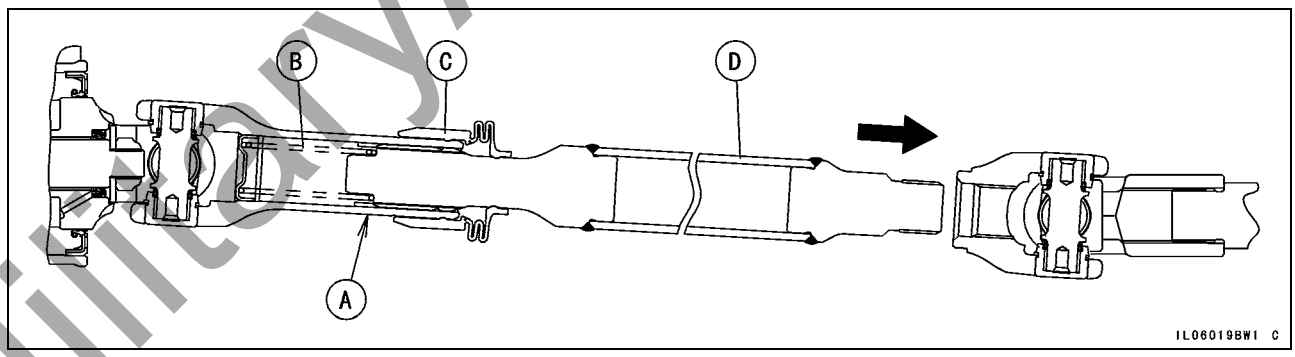
Front Propeller Shaft

● Install:
Universal Joint [A]
Boot [B]
○Align each yoke [C] with the other yoke as shown in the figure.



● Apply soap and water solution on the yoke [A].
● Install:
Spring [B]
Boot [C]
Propeller Shaft [D]
○Install the front end of the propeller shaft, and then install the rear end as shown in the figure.



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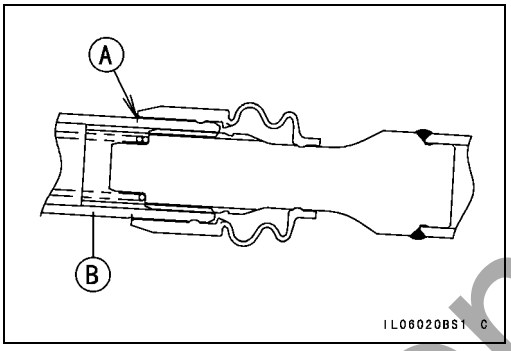
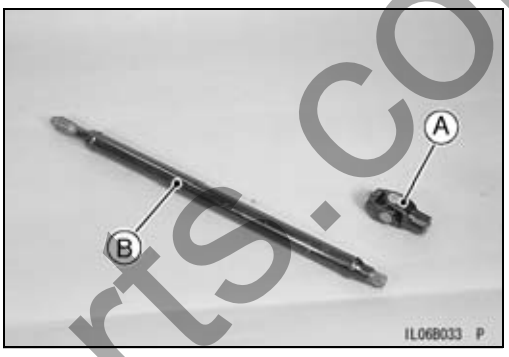
Front Propeller Shaft

● Match the boot end [A] to the groove of the yoke [B].



Front Propeller Shaft Inspection

● Remove:
Front Propeller Shaft (see Front Propeller Shaft Removal)
● Check that the universal joint [A] works smoothly without rattling or sticking.
★If it does rattle or stick, the universal joint is damaged. Replace the universal joint.
● Check the splines of the propeller shaft [B] and universal joint.
★If the splines are twisted or damaged in any way, replace the damaged parts.
● Also, inspect the splines in the universal joint of the front final gear case and the output bevel gear shaft.
★If the splines are badly worn, chipped, or loose, replace the damaged parts.



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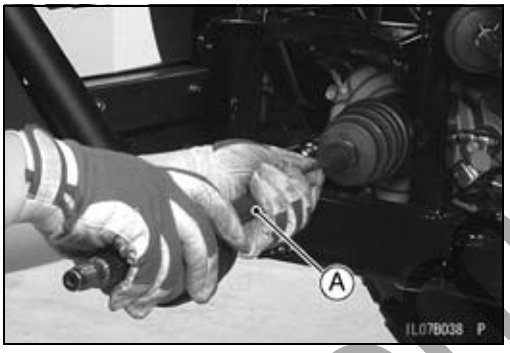
Front Axle

Front Axle Removal



- Drain the front final gear case oil (see Front Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Remove:
  Front Wheel (see Wheel Removal in the Wheels/Tires chapter)
  Steering Knuckle (see Steering Knuckle Removal in the Steering chapter)
- Pull the front axle [A] in a straight line out of the front final gear case.

Front Axle Installation

- Wipe the old grease off the splines of the axle and the gear case oil seal.
- Visually inspect the splines of the axle.

★If they are badly worn or chipped, replace the axle with a new one.

- Apply molybdenum disulfide grease to the axle splines.
- Apply grease to the gear case oil seal.
- Push [A] the end of the front axle straght and install it in the gear case.

NOTE

○*The axle shaft must not come off easily.*

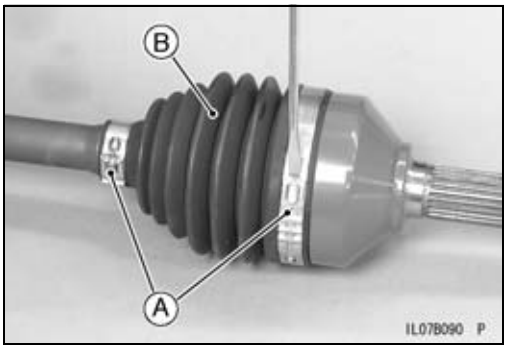
Front Axle Joint Boot Inspection

- Refer to the Front Axle Joint Boot Inspection in the Periodic Maintenance chapter.

Front Axle Joint Boot Replacement

Outboard Joint Boot Removal

- Remove:
  Front Axle (see Front Axle Removal)
- Tap the joint portion of the boot bands [A] with a suitable tool.
- Scrap the removed boot bands.
- Slide the joint boot [B] toward the inboard joint.



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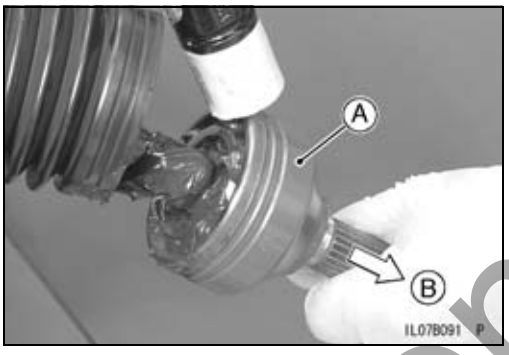
Front Axle

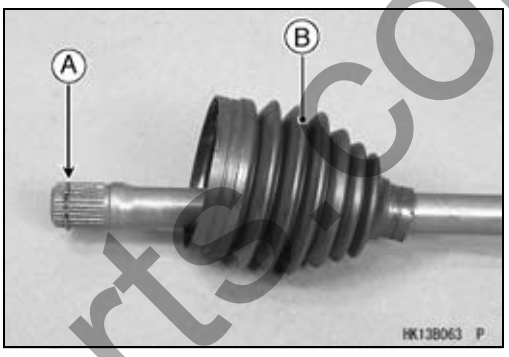
● Tap the bearing housing [A] straight [B] with a plastic hammer to separate it from the shaft.



NOTICE

Do not tap on the cage. Be careful not get hurt when the housing comes out. If the splined portion of shaft cracked or damaged during disassembling of outboard joint, do not reuse the shaft.

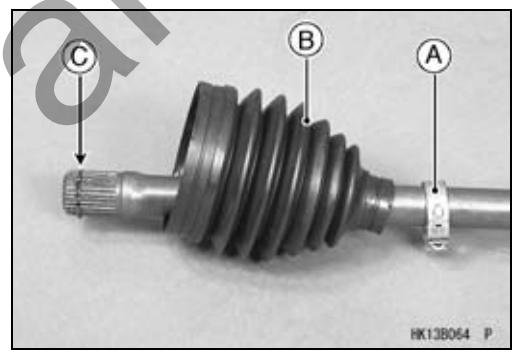
● Remove:
Circlip [A]
Boot [B]



Outboard Joint Boot Installation

● Clean the axle shaft by wiping off the used grease on it.
● Wind the tape on the splines of the axle shaft in order to protect the joint boot.
● Install:
New Small Band [A]
New Boot [B]

○Apply the special grease slightly on the inside of the new boot small diameter, and install the boot on the axle shaft.

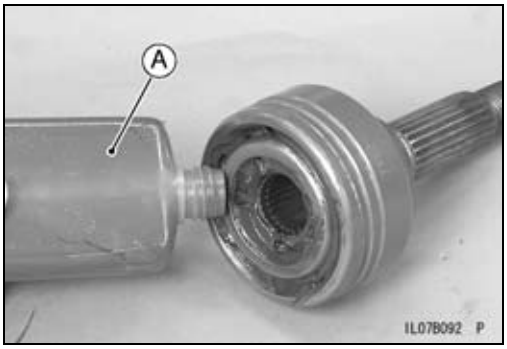


NOTICE

Only the special grease that is included with the boot kit can be applied to the boots.

● Install:
New Circlip [C]

● Place the special grease tube nozzle in the bore of the housing and squeeze the tube [A] until the grease comes out from the joint bearing.



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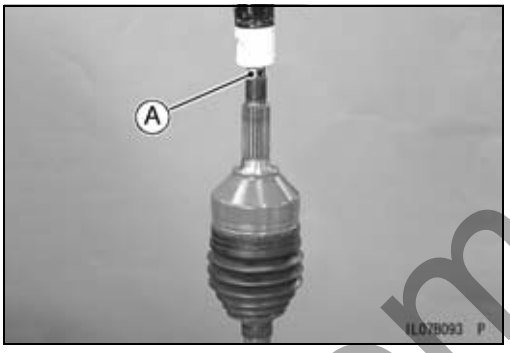
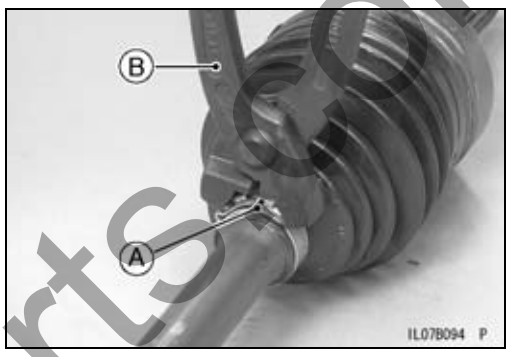
Front Axle

- Tap the shaft end [A] straight with a plastic hammer until it is locked by the circlip.

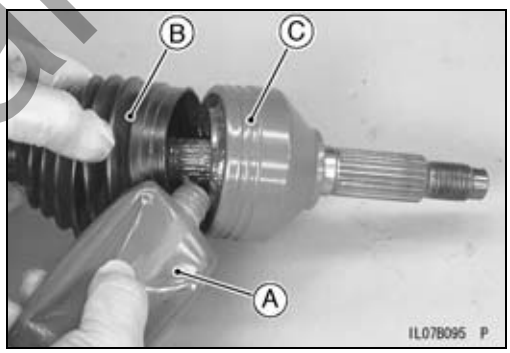


- Pinch the small boot band [A] with a suitable tool [B] to install it.

  Recommend Tool: OETIKER 192

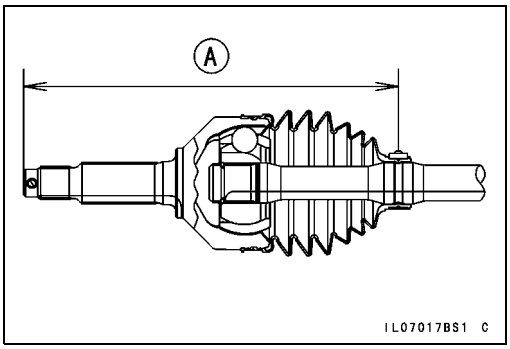


- Squeeze all of the special grease [A] into the new boot [B], and slide the boot onto the outboard joint [C].

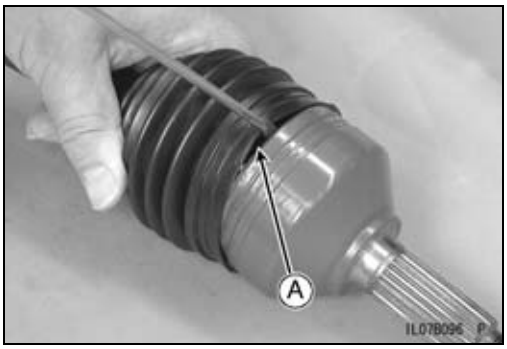


- Compress the axle assembly to the specified length while relieving the air pressure inside the inboard boot.
- Hold the axle at this setting.

  Standard Length of Assembling:
  Front Axle: 206 mm (8.11 in.) [A]



- Open the edge [A] of the boot in order to equalize the air pressures.



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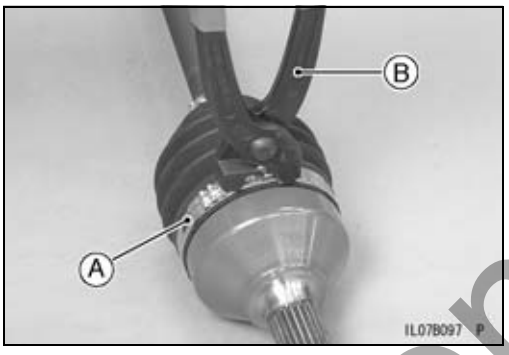
Front Axle

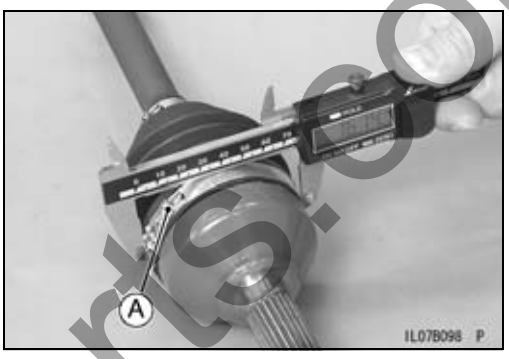
- Pinch the boot bands [A] with a suitable tool [B] to install it.

  Recommend Tool: OETIKER 192



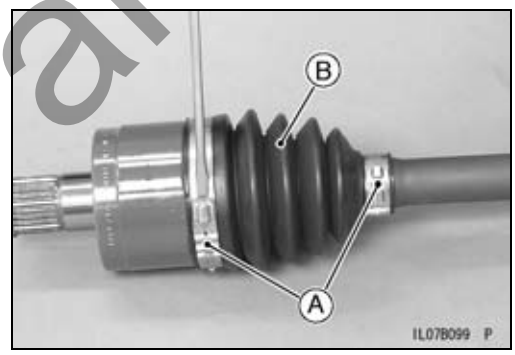
- Be sure outside diameter of the band [A] is less than the maximum diameter.

  Maximum Outside Diameter of Band: 82.9 mm (3.26 in.)

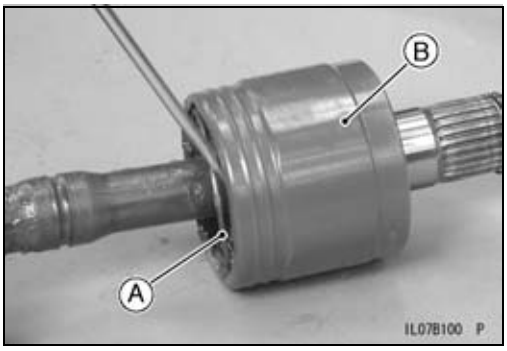


Inboard Joint Boot Removal

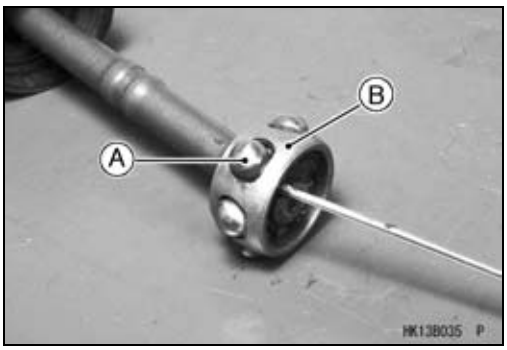
- Remove:
  Front Axle (see Front Axle Removal)
- Tap the joint portion of the boot bands [A] with a suitable tool.
- Scrap the removed boot bands.
- Slide the joint boot [B] toward the outboard joint.



- Remove the retaining ring [A].
- Separate the bearing cup [B] from the axle shaft.



- Remove the steel balls [A].
- Slide the cage [B] toward the outboard joint.



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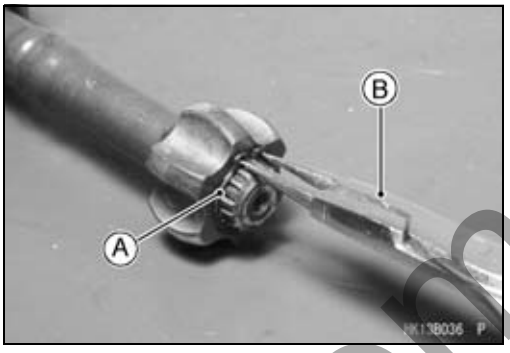
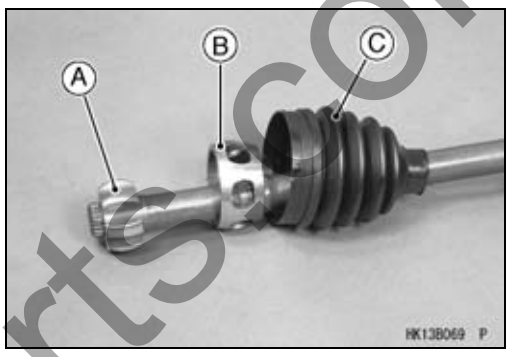
Front Axle

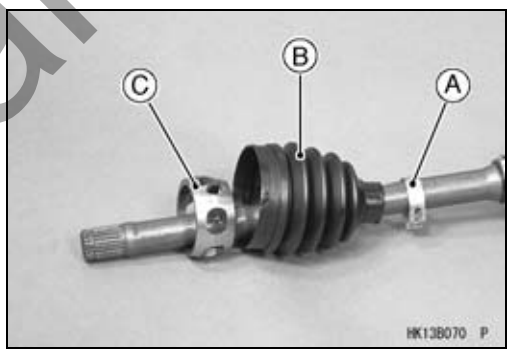
● Remove:
Circlip [A]
Special Tool - Outside Circlip Pliers [B]: 57001-144



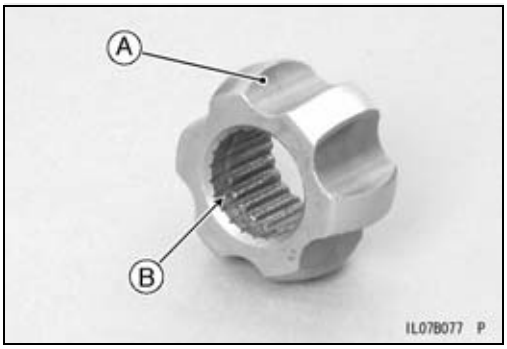
● Remove:
Inner Race [A]
Cage [B]
Inboard Joint Boot [C]



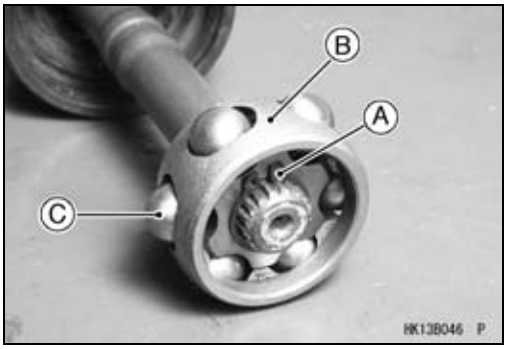
Inboard Joint Boot Installation
● Install:
New Small Band [A]
New Inboard Joint Boot [B]
Cage [C]



● Install the inner race [A] so that the flat serration side [B] faces outboard joint.



● Install:
New Circlip [A]
Special Tool - Outside Circlip Pliers: 57001-144
● Slide the cage [B] on the inner race and install the steel balls [C].



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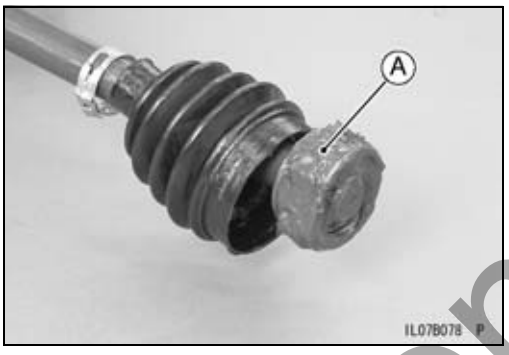
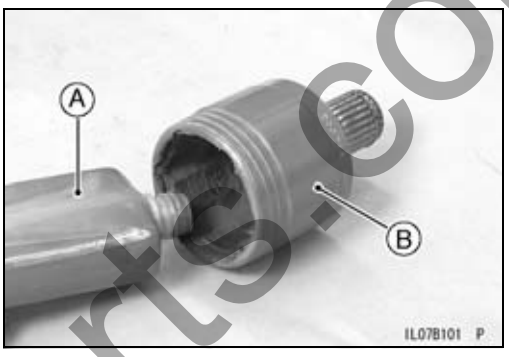
Front Axle

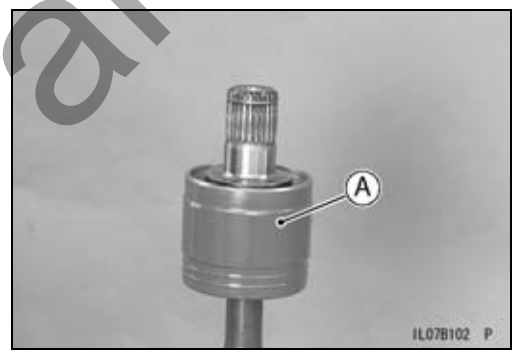
- Apply the special grease [A] to the steel balls and cage.



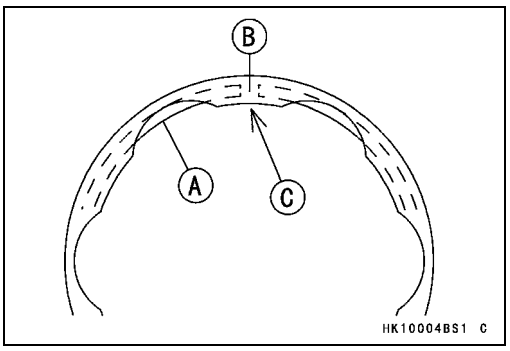
- Squeeze about half a tube of the special grease [A] into the bearing cup [B].



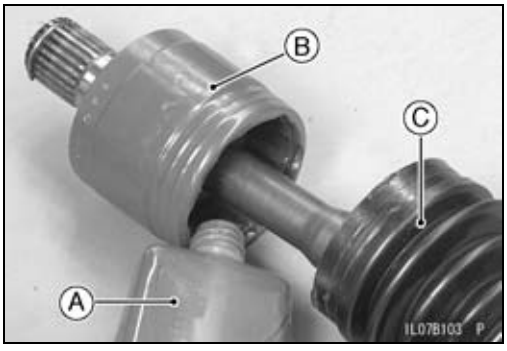
- Install the bearing cup [A] onto the balls and cage assembly.



- Install the new retaining ring [A] so that the opening [B] is aligned with one of the projections [C].



- Squeeze the remaining special grease [A] into the bearing cup [B] and inboard joint boot [C].



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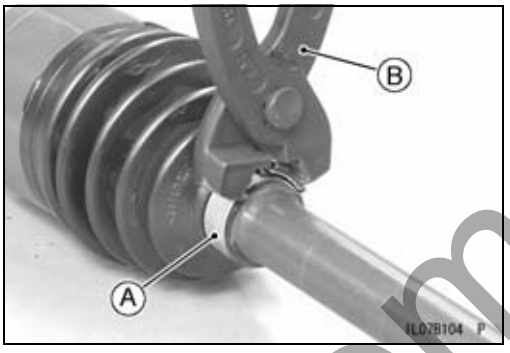
Front Axle

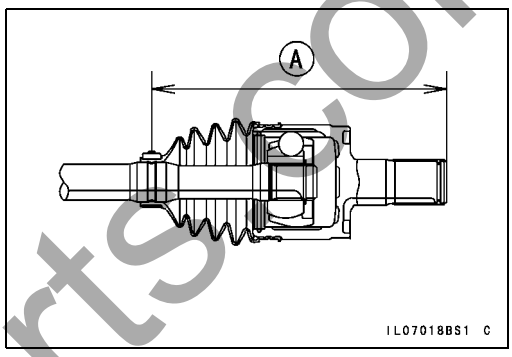
- Pinch the small boot band [A] with a suitable tool [B] to install it.

  Recommend Tool: OETIKER 192

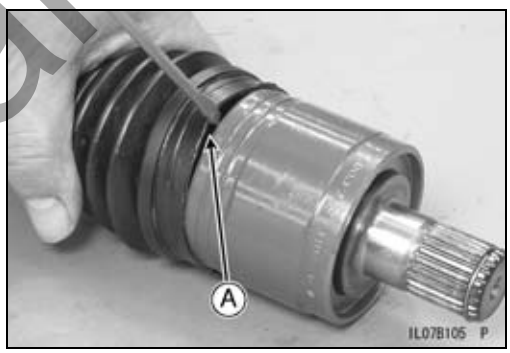


- Compress the axle assembly to the specified length while relieving the air pressure inside the inboard boot.
- Hold the axle at this setting.

  Standard Length of Assembling
  Front Axle: 162.2 mm (6.39 in.) [A]

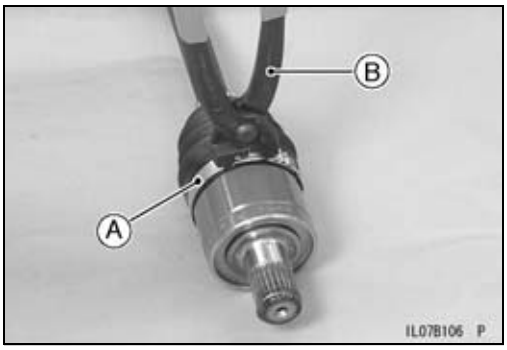


- Open the edge [A] of the boot in order to eqalize the air pressures.



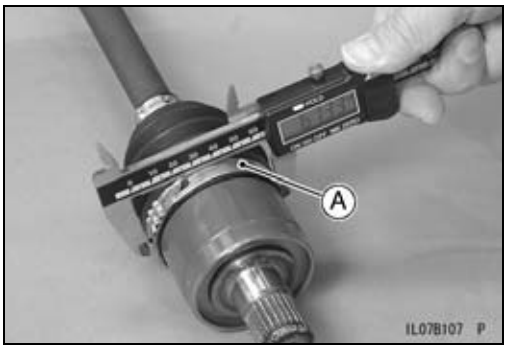
- Pinch the boot band [A] with a suitable tool [B] to install it.

  Recommend Tool: OETIKER 192



- Be sure the outside diameter of the band [A] is less than the maximum diameter.

  Maximum Outside Diameter of Band: 73.4 mm (2.89 in.)



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Front Final Gear Case

Front Final Gear Case Oil Level Inspection

- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Remove the filler cap.

NOTICE

Be careful not to allow any dirt or foreign materials to enter the gear case.

- Check the oil level. The oil level should come to the bottom of the filler opening [A].

★If it is insufficient, first check the front final gear case for oil leakage, remedy it if necessary, and add oil through the filler opening. Use the same type and brand of oil that is already in the final gear case.

- Be sure the O-ring is in place.
- Apply grease to the O-ring and tighten the filler cap.

Torque - Front Final Gear Case Oil Filler Cap: 29 N·m (3.0 kgf·m, 21 ft·lb)

Front Final Gear Case Oil Change

- Refer to the Front Final Gear Case Oil Change in the Periodic Maintenance chapter.

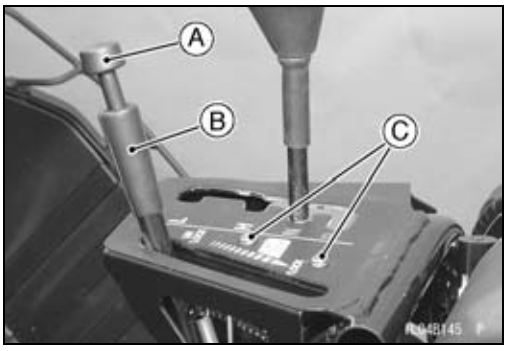
Differential Shift Lever Play Inspection

- Refer to the Differential Shift Lever Play Inspection in the Periodic Maintenance chapter.

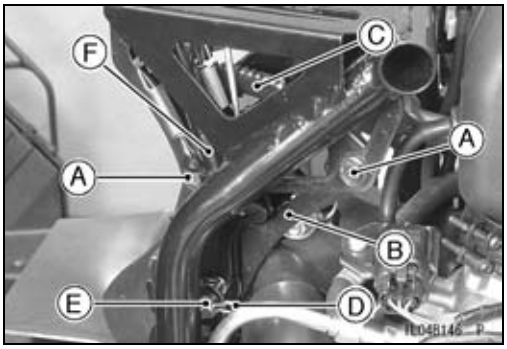
Differential Shift Lever Play Adjustment

- Refer to the Differential Shift Lever Play Adjustment in the Periodic Maintenance chapter.

Differential Shift Lever Removal



- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Differential Shift Cable Rear End (see Differential Shift Cable Removal)
  Cap [A]
  Damper [B]
  Bolts [C]
- Remove the double stick tape for damper.



- Remove:
  Bolts [A]
  Bracket [B]
  Ratchet [C]
  Snap Pin [D]
  Pin [E]
  Differential Shift Lever Assembly [F]

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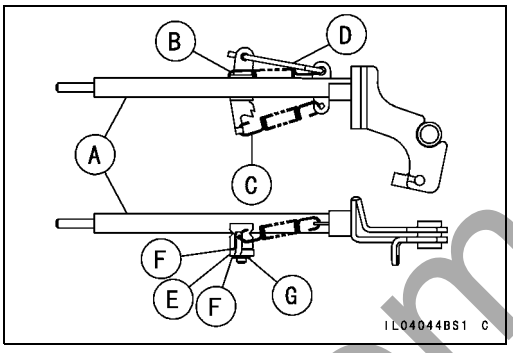
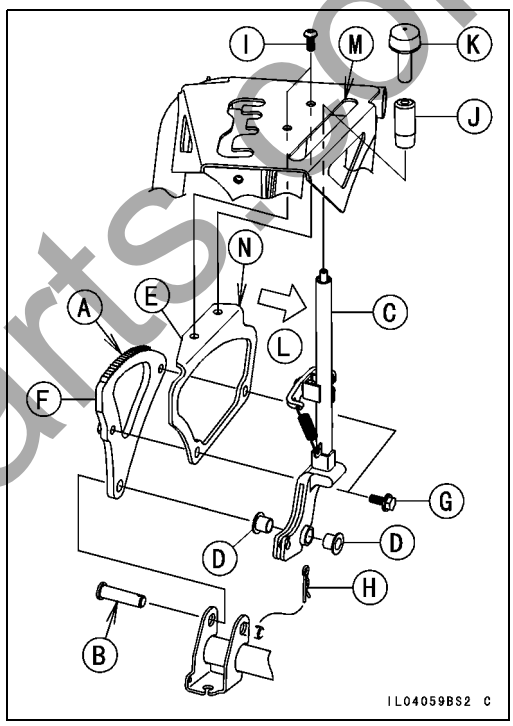
Front Final Gear Case

Differential Shift Lever Installation

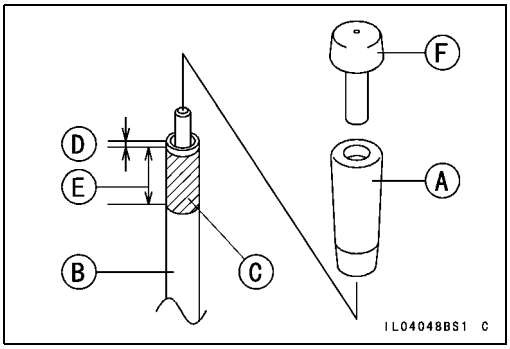


- Install:
  Lever Assembly [A]
  Spring [B]: Coil Length = 16 mm (0.63 in.)
  Spring [C]: Coil Length = 20 mm (0.79 in.)
  Rod [D]
  Lever [E]
  Washers [F]
  New Circlip [G]



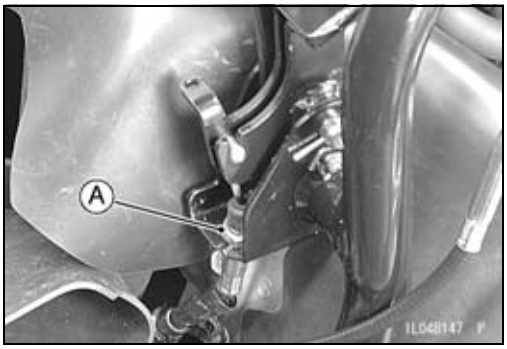
- Apply grease (Chevron Black Pearl Grease EP NLGI 2 or equivalent grease):
  Teeth [A] of Ratchet
  Pin [B]
- Install:
  Lever Assembly [C]
  Bushings [D]
  Bracket [E]
  Ratchet [F]
  Bolts [G]
  Pin [B]
  Snap Pin [H]
  Bolts [I]
  Damper [J]
  Cap [K]
- Tighten the bolts [I] with bracket [E] pushed to the arrow [L] direction.

○The line [M] shall be parallel to line [N].



- Install the damper [A] to the rod [B] of lever assembly as shown in the figure.
  Double Stick Tape [C]
  1 ~ 2 mm (0.04 ~ 0.08 in.) [D]
  40 mm (1.57 in.) [E]
  Cap [F]

Differential Shift Cable Removal



- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
- Loosen the locknut [A].

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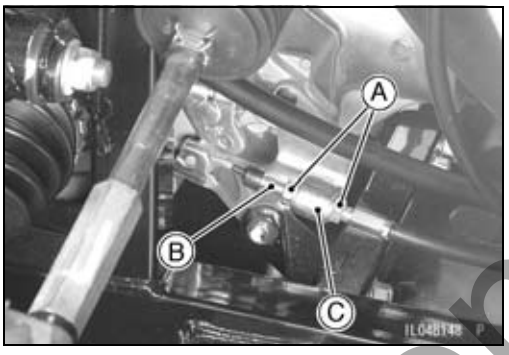
Front Final Gear Case

- Loosen the locknuts [A].
- Remove the cable [B] from the bracket [C].
- Remove both cable ends.



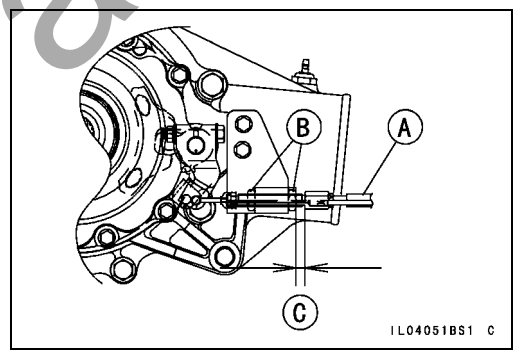
Differential Shift Cable Installation

- Lubricate the differential shift cable before installation.
- Apply grease to the end of the cable.
- Route the cable correctly the according to the Cable, Wire, and Hose Routing in the Appendix chapter.

⚠ WARNING

Operation with an improperly adjusted, incorrectly routed or damaged cables could result in an unsafe riding Condition. Follow the service manual to make sure to correct any of these conditions.

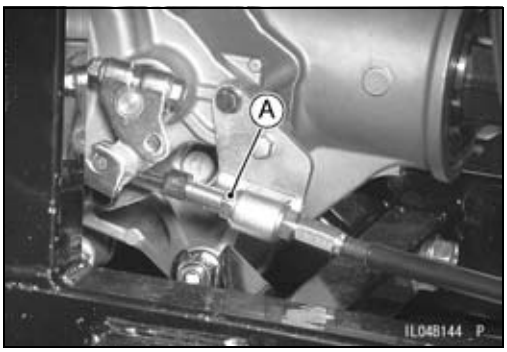
- When installing the new cable, set the cable as shown in the figure.
  Differential Shift Cable [A]
  Differential Shift Cable Locknuts [B]
  6 ±0.5 mm (0.24 ±0.02 in.) [C]



- Tighten:

  Torque - Differential Shift Cable Locknut [A]: 9.8 N·m (1.0 kgf·m, 87 in·lb)

- Check the differential shift lever play (see Differential Shift Lever Play Inspection in the Periodic Maintenance chapter).



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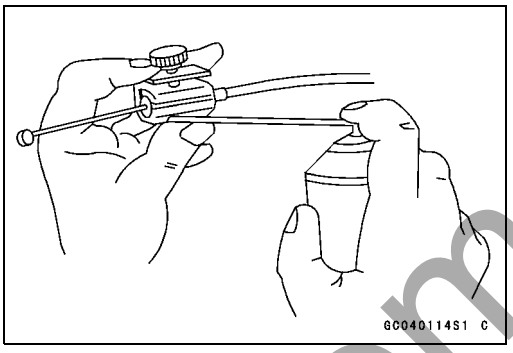
Front Final Gear Case

Differential Shift Cable Lubrication

Whenever the differential shift cable is removed, lubricate the cable as follows:

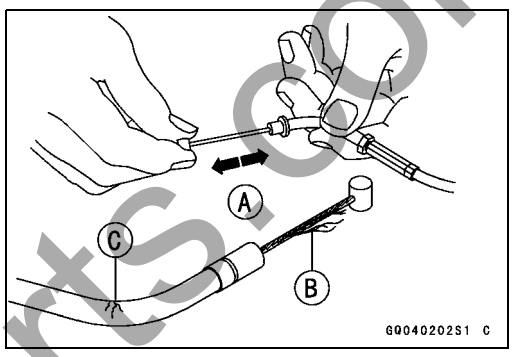
- Apply a small amount of multi-purpose grease to the cable (both ends).
- Lubricate the cable with a penetrating aerosol cable lubricant through the pressure cable luber.



Differential Shift Cable Inspection

- With the differential shift cable disconnected at both ends, the cable should move freely within the cable housing.

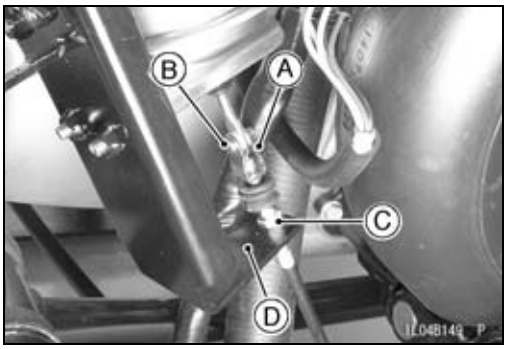
★If the cable does not move freely [A] after lubricating, if the cable is frayed [B], or if the housing is kinked [C], replace the cable.



2WD/4WD Shift Cable Removal

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Right Bracket (see Right Bracket Removal in the Frame chapter)

- Remove:
  Snap Pin [A]
  Pin [B] and Washer
- Loosen the nut [C] and remove the 2WD/4WD shift cable from the bracket [D].



- Remove:
  2WD/4WD Shift Cable Locknuts [A]
  2WD/4WD Shift Cable End [B]
- Remove the 2WD/4WD shift cable from the frame.

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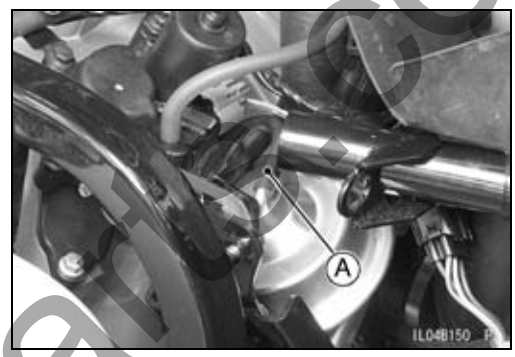
Front Final Gear Case

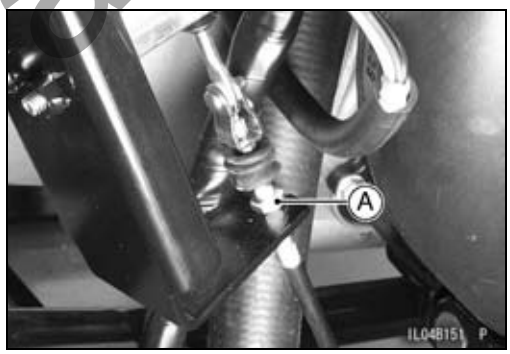
2WD/4WD Shift Cable Installation

- Apply grease to the front end of the cable.
- Run the 2WD/4WD shift cable according to the Cable, Wire and Hose Routing section in the Appendix chapter.
- Install:
  2WD/4WD Shift Cable Rear End
  2WD/4WD Shift Cable Front End
  Pin and Washer
  Snap Pin
- Support the vehicle on a stand or a jack so that the all wheels are off the ground.
- Shift the transmission in neutral position.
- Remove:
  Vacuum Hose [A]



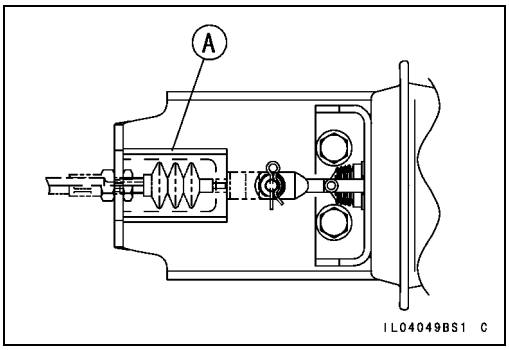
- Tighten:

Torque - 2WD/4WD Shift Cable Locknut [A]: 4.4 N·m (0.45 kgf·m, 39 in·lb)



- Install the cable tension adjusting tool [A] on the cable and between the brackets as shown in the figure.

Special Tool - Cable Tension Adjusting Tool: 57001-1716



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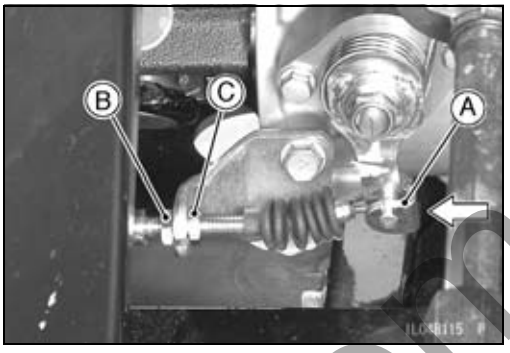
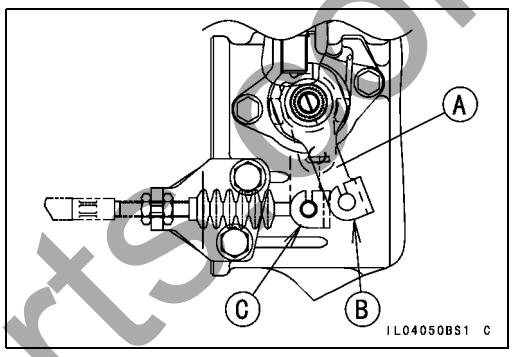
Front Final Gear Case

- Push the 2WD/4WD shift shaft lever [A] rearward (4WD position) and make the engagement of the shifter maximum while turning the propeller shaft by hand.
- Turn the nut [B] with fingers and pull slightly the inner cable.
- Tighten:

Torque - 2WD/4WD Shift Cable Locknut [C]: 4.4 N·m (0.45 kgf·m, 39 in·lb)

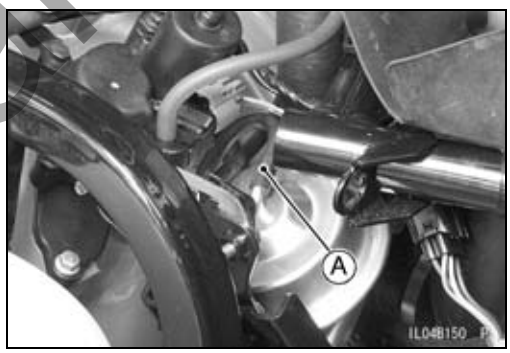


- Remove the cable tension adjusting tool.
- Confirm the 2WD/4WD shift shaft lever [A] return to 2WD position [B].
  4WD Position [C]
- Install the vacuum hose to the actuator.
- Install the removed parts.

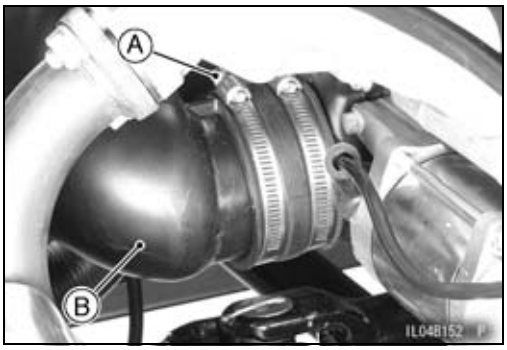


2WD/4WD Vacuum Actuator Removal

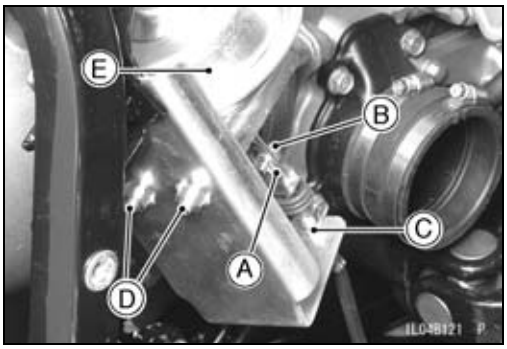
- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Right Bracket (see Right Bracket Removal in the Frame chapter)
  Vacuum Hose [A]



- Loosen the clamp screw [A] and duct [B].



- Remove:
  Snap Pin [A]
  Pin [B] and Washer
- Loosen the nut [C] and remove the 2WD/4WD shift cable from the bracket.
- Remove:
  2WD/4WD Vacuum Actuator Mounting Bolts [D]
  2WD/4WD Vacuum Actuator [E]



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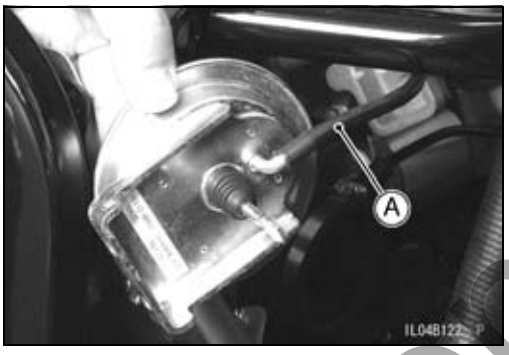
Front Final Gear Case

- Remove:
  Lower Hose [A]



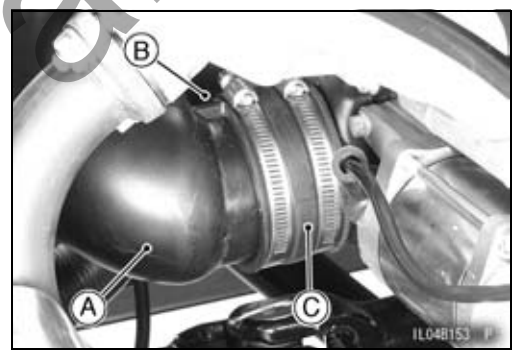
2WD/4WD Vacuum Actuator Installation

- Install:
  Lower Hose
- Install the 2WD/4WD vacuum actuator to the bracket and tighten the 2WD/4WD vacuum actuator mounting bolts.

Torque - Vacuum Actuator Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install:
  2WD/4WD Shift Cable (see 2WD/4WD Shift Cable Installation)

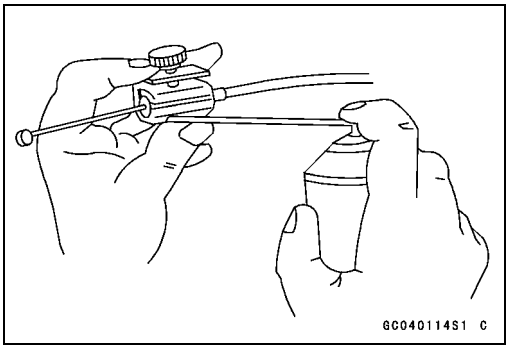
- Install the duct [A] so that the projection [B] of the duct inserts the groove of the rubber duct [C].
- Install the removed parts.



2WD/4WD Shift Cable Lubrication

Whenever the 2WD/4WD shift cable is removed, lubricate the cable as follows:

- Apply a small amount of multi-purpose grease to the cable (both ends).
- Lubricate the cable with a penetrating aerosol cable lubricant through the pressure cable luber.



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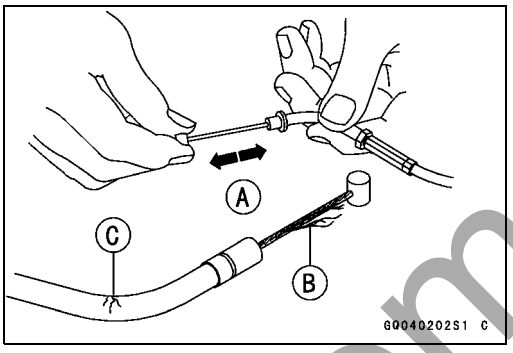
Front Final Gear Case

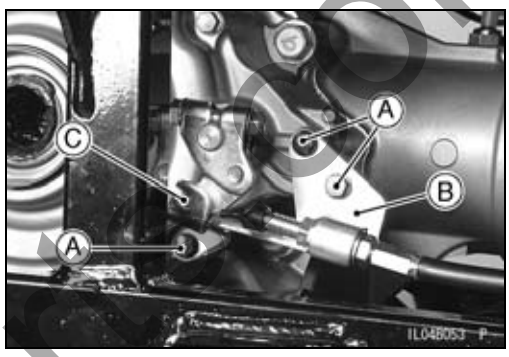
2WD/4WD Shift Cable Inspection



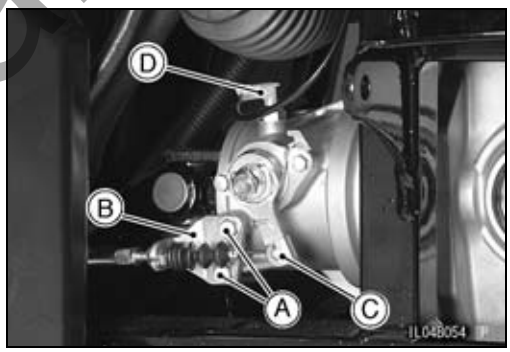
- With the 2WD/4WD shift cable disconnected at both ends, the cable should move freely within the cable housing.

★If the cable does not move freely [A] after lubricating, if the cable is frayed [B], or if the housing is kinked [C], replace the cable.

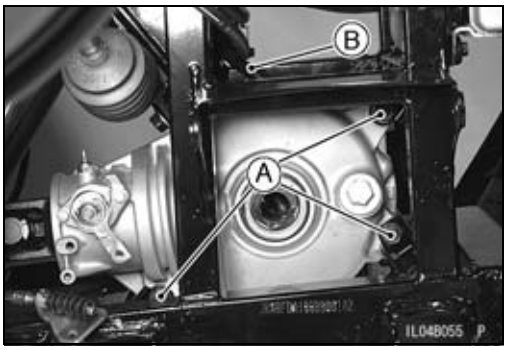
Front Final Gear Case Removal



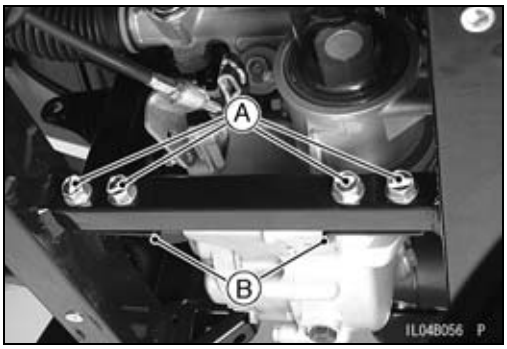
- Drain the gear case oil (see Front Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Remove:
  Front Bottom Guard (Front Bottom Guard Removal in the Frame chapter)
  Front Axles (see Front Axle Removal)
  Front Propeller Shaft (Front Propeller Shaft Removal)
  Differential Shift Cable Holder Bolts [A] and Cable Holder [B]
  Differential Shift Cable End [C]



- Remove:
  Cable Holder Bolts [A] and Cable Holder [B]
  2WD/4WD Shift Cable End [C]
  2WD/4WD Shift Position Switch Lead Connector [D]



- Remove:
  Front Final Gear Case Mounting Bolts [A] and Nuts
  Breather Hose [B]



- Remove:
  Front Final Gear Case Bracket Bolts [A]
  Brackets [B]

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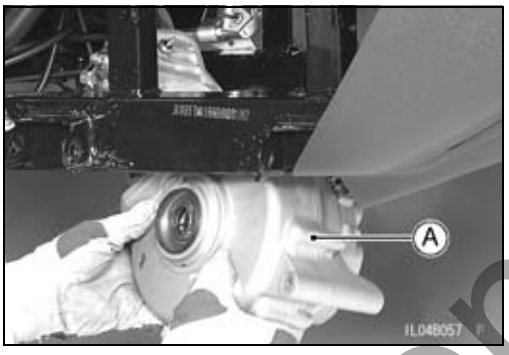
Front Final Gear Case

- Remove front final gear case [A] from under the vehicle.



Front Final Gear Case Installation

- Install:
  Front Final Gear Case
  Front Side Bolts (2) and Nuts
  Front Final Gear Case Bracket and Bolts
  Rear Side Bolt and Nut
- Tighten:

Torque - Front Final Gear Case Bracket Bolts: 90.5 N·m (9.2 kgf·m, 67 ft·lb)
Front Final Gear Case Mounting Nuts: 90.5 N·m (9.2 kgf·m, 67 ft·lb)

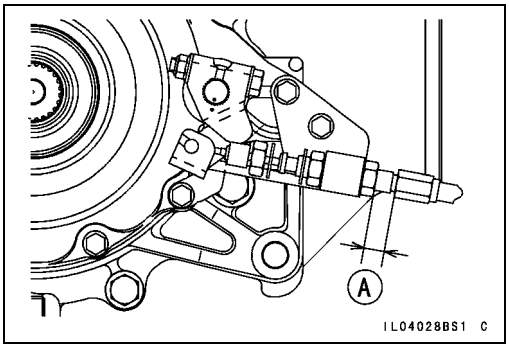
- Install:
  Breather Hose
  2WD/4WD Shift Cable End (see 2WD/4WD Shift Cable Installation)
  2WD/4WD Shift Cable Holder and Bolts
  2WD/4WD Shift Position Switch Lead Connector
- Apply a non-permanent locking agent to the holder bolts.
- Tighten:

Torque - 2WD/4WD Shift Cable Holder Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install:
  Differential Shift Cable End (see Variable Shift Cable Installation)
  Differential Shift Cable Holder and Bolts
- Tighten:

Torque - Front Final Gear Case Left Cover Bolts (M6): 8.8 N·m (0.90 kgf·m, 78 in·lb)
Differential Shift Cable Holder Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install the differential shift cable so that the distance [A] between the nut and casing cap is 6 mm (0.24 in.).



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Front Final Gear Case

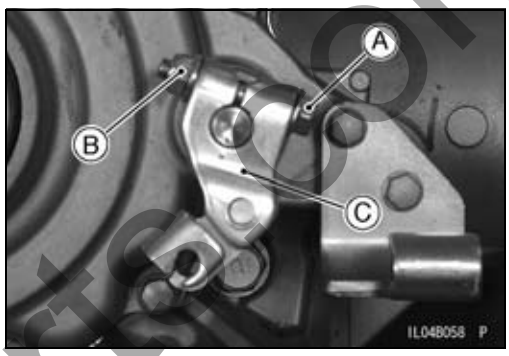
- Install the drain plug and a new O-ring.
○Apply grease to the O-ring.
- Tighten:

Torque - Front Final Gear Case Oil Drain Plug: 15 N·m (1.5 kgf·m, 11 ft·lb)

- Install the removed parts.
- Fill the front final gear case with the specified oil (see Front Final Gear Case Oil Change in the Periodic Maintenance chapter)

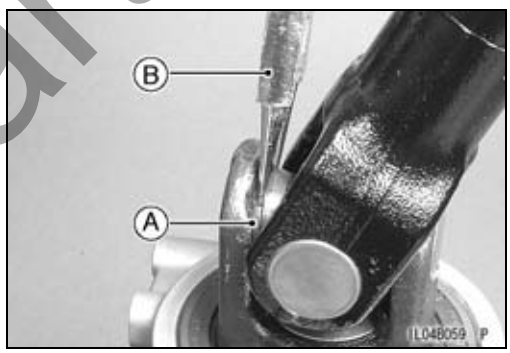
Front Final Gear Case Disassembly

- Remove:
  Front Final Gear Case (see Front Final Gear Case Removal)
  Differential Control Shift Shaft Lever Bolt [A] and Nut [B]
  Differential Control Shift Shaft Lever [C]

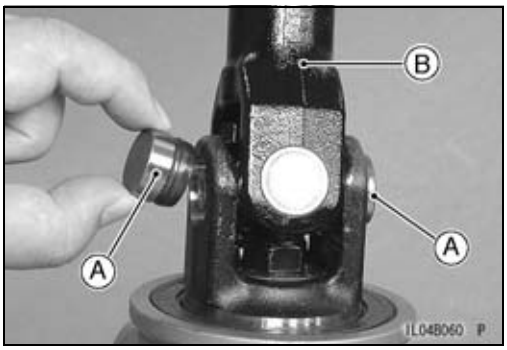


- Remove:
  Snap Rings [A] (both sides)

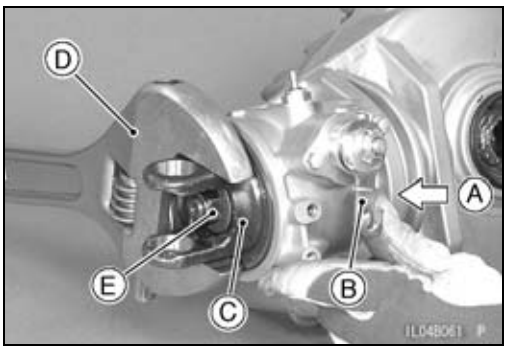
Special Tool - Outside Circlip Pliers [B]: 57001-144



- Remove:
  Caps [A]
  Yoke [B]



- Push [A] and hold the 2WD/4WD shift shaft lever [B].
- Hold the coupling [C] with a wrench [D].
- Remove:
  Coupling Nut [E]



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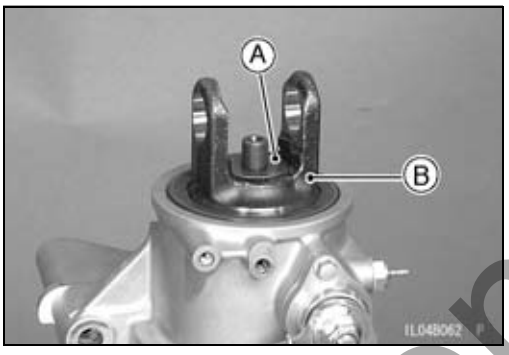
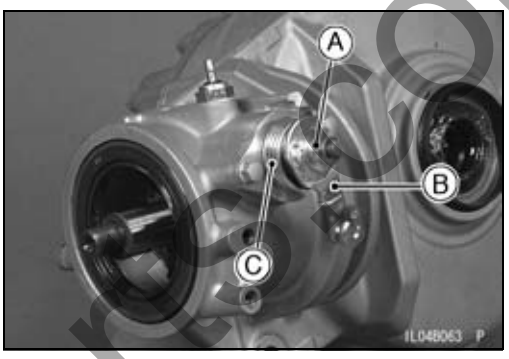
Front Final Gear Case

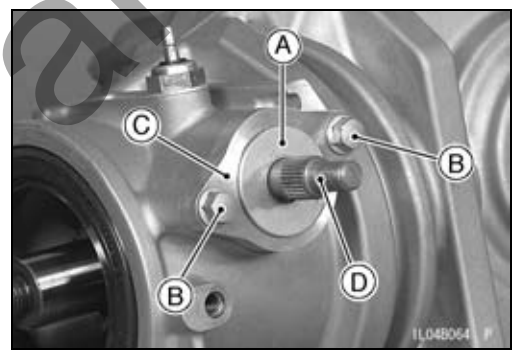
- Remove:
  Washer [A]
  Coupling [B]



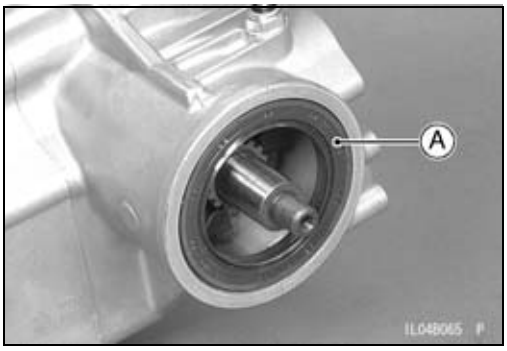
- Remove:
  2WD/4WD Shift Shaft Lever Nut [A]
  2WD/4WD Shift Shaft Lever [B]
  Spring [C]



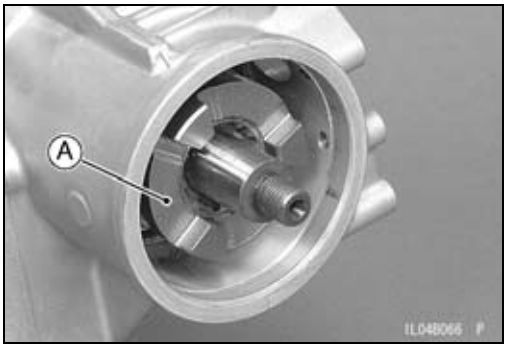
- Remove:
  Washer [A]
  2WD/4WD Shift Shaft Cover Bolts [B]
  2WD/4WD Shift Shaft Cover [C]
  2WD/4WD Shift Shaft [D]



- Remove:
  Oil Seal [A]



- Remove:
  Shifter [A]



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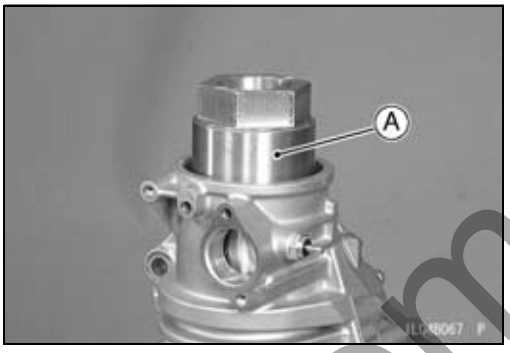
Front Final Gear Case

- Hold the front final gear case in a vise, and remove the bearing holder using the socket wrench [A].

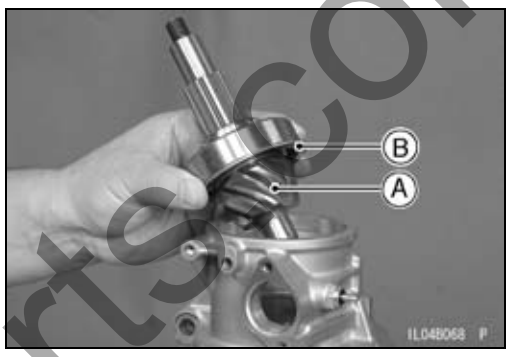
  Special Tool - Socket Wrench, Hex 50: 57001-1478

★If the holder seems too difficult to break free, apply heat to softer the locking agent.

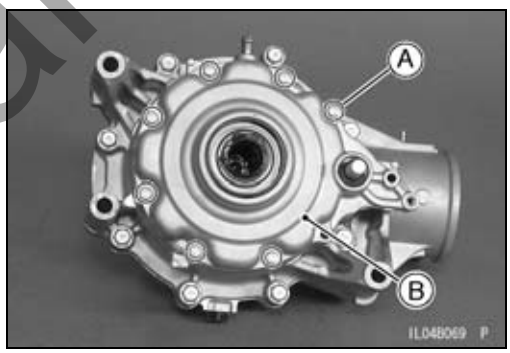
- Remove:
  Pinion Gear Bearing Holder



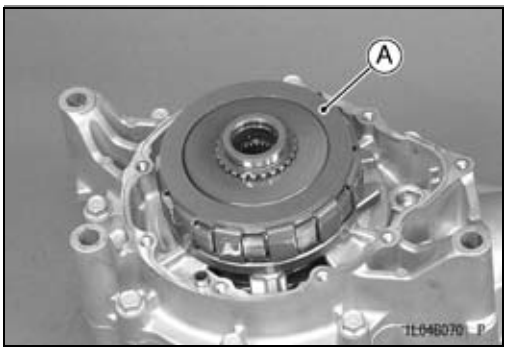
- Remove:
  Pinion Gear Unit [A]
  Shim(s) [B]



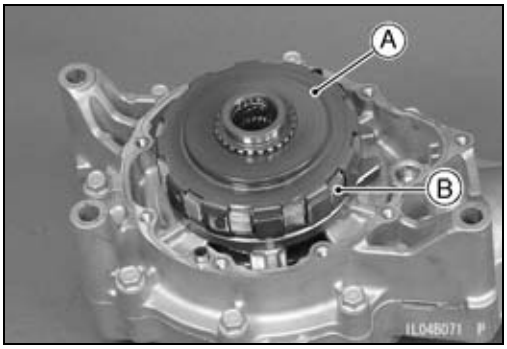
- Remove:
  Front Final Gear Case Left Cover Bolts [A]
  Front Final Gear Case Left Cover [B]
  Differential Control Shift Shaft
  Spring



- Remove:
  Outer Disc [A]
  Needle Bearing



- Remove:
  Housing [A] and Differential Disc Assembly [B]
  Inner Disc
  Needle Bearing



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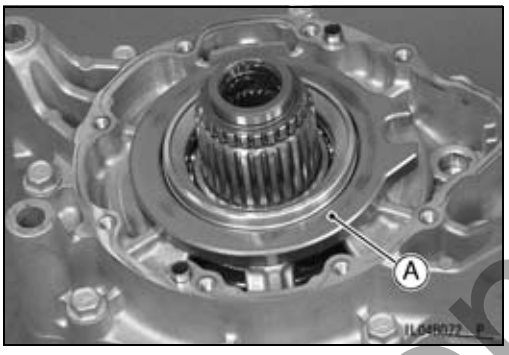
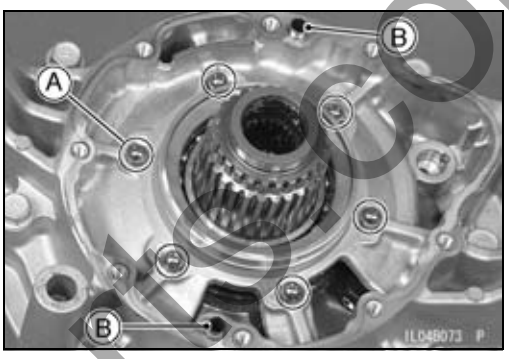
Front Final Gear Case

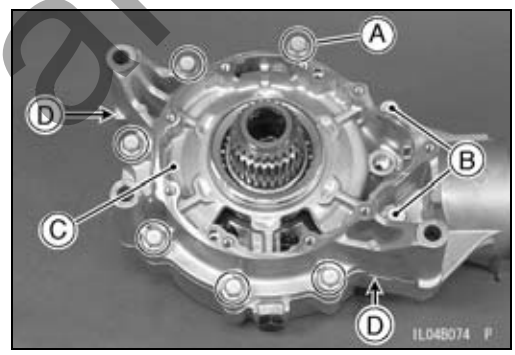
● Remove:
Cam Plate [A]



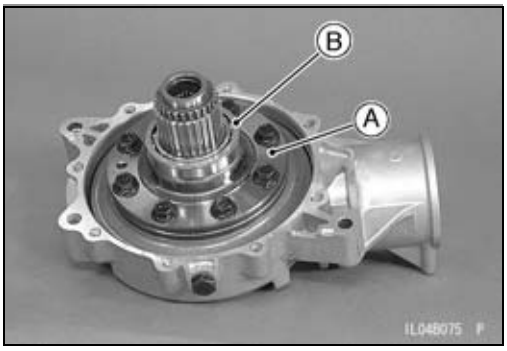
● Remove:
Steel Balls [A]
Dowel Pins [B]



● Remove:
Front Final Gear Case Center Cover Bolts (M8) [A]
Front Final Gear Case Center Cover Bolts (M10) [B]
Front Final Gear Case Center Cover [C]
○Using the pry points [D], remove the cover.



● Remove:
Ring Gear Assembly [A]
Shim(s) [B]



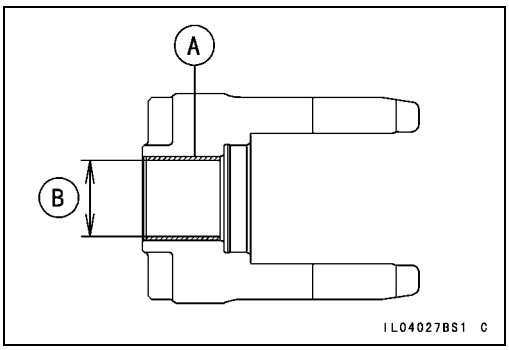
Front Final Gear Case Coupling Inspection

★If the coupling bushing [A] is damaged or worn, replace the front final gear case coupling.

Front Final Gear Case Coupling Bushing Inside Diameter [B]

Standard: 20.000 ~ 20.021 mm (0.7874 ~ 0.7882 in.)

Service Limit: 20.051 mm (0.7894 in.)



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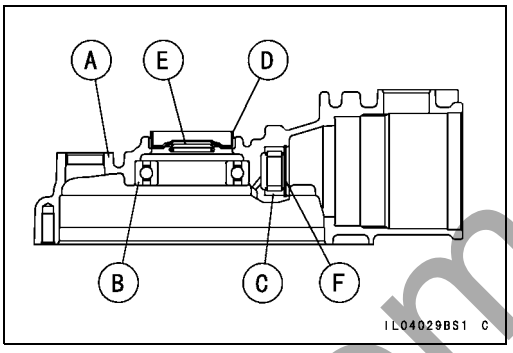
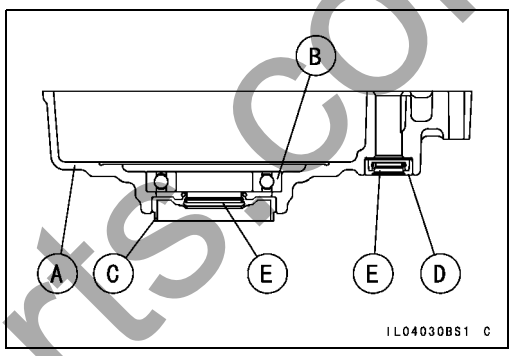
Front Final Gear Case

Front Final Gear Case Assembly

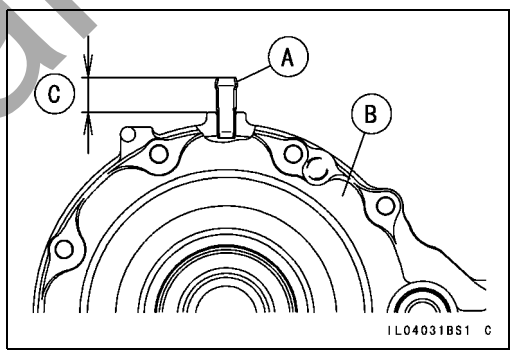


- Press the following parts in the right cover [A] until they are bottomed.
  Ball Bearing [B]
  Needle Bearing [C]
  Oil Seal [D]
- Apply grease to the oil seal lips [E].
- Install:
  Circlip [F]

Special Tool - Inside Circlip Pliers: 57001-143

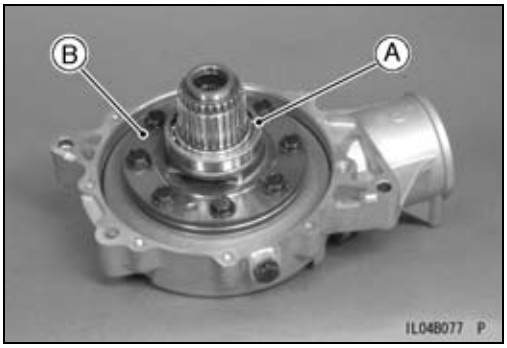


- Press the following parts in the left cover [A] until they are bottomed.
  Ball Bearing [B]
  Oil Seal [C]
- Press the oil seal [D] so that the surface is flush with the end of the hole.
- Apply grease to the oil seal lips [E].



- Press the fitting pipe [A] in the left cover [B] as shown in the figure.
  14 mm (0.55 in.) [C]

- Visually check the pinion gear and ring gear for scoring, chipping, or other damage.
- ★Replace the bevel gear as a set if either gear is damaged since they are lapped as a set in the factory to get the best tooth contact.
- Refer to the gear backlash and tooth contact pattern (see Front Final Bevel Gear Adjustment).



- Apply engine oil to the teeth of the ring gear.
- Install:
  Shim(s) [A] (both sides)
  Ring Gear Assembly [B]

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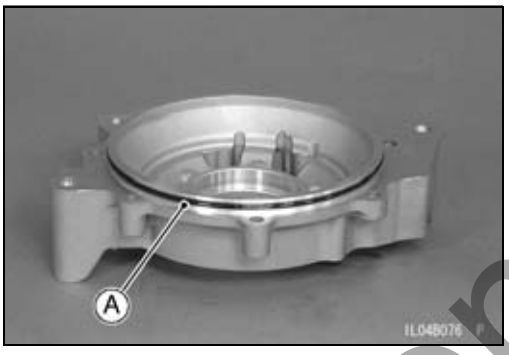
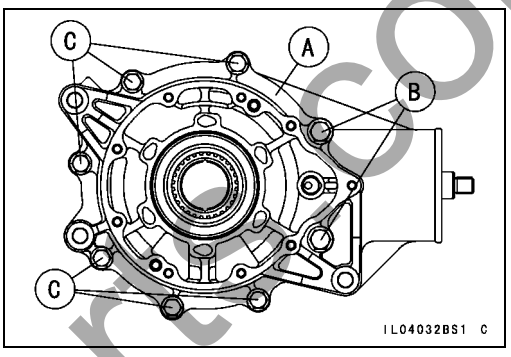
Front Final Gear Case

- Apply grease to the O-ring [A] on the front final gear case center cover.

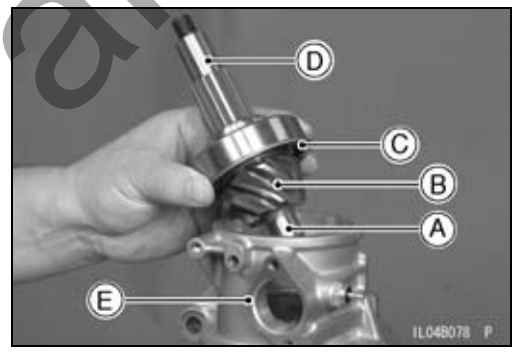


- Install:
  Front Final Gear Case Center Cover [A]
- Apply a non-permanent locking agent:
  Front Final Gear Case Center Cover Bolts (M10) [B]
  Front Final Gear Case Center Cover Bolts (M8) [C]
- Tighten:

Torque - Front Final Gear Case Center Cover Bolts (M10): 49 N·m (5.0 kgf·m, 36 ft·lb)
Front Final Gear Case Center Cover Bolts (M8): 24 N·m (2.4 kgf·m, 18 ft·lb)

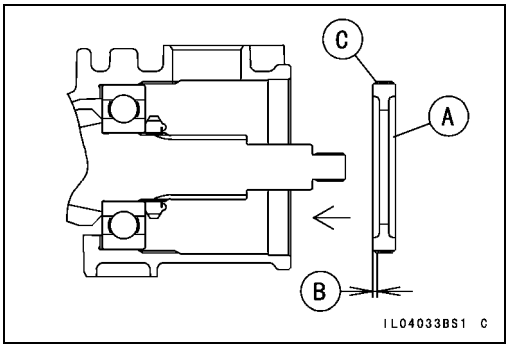


- Apply engine oil to the journal [A] and teeth [B].
- Insert the shim [C] and pinion gear unit [D] in the front final gear case right cover [E].

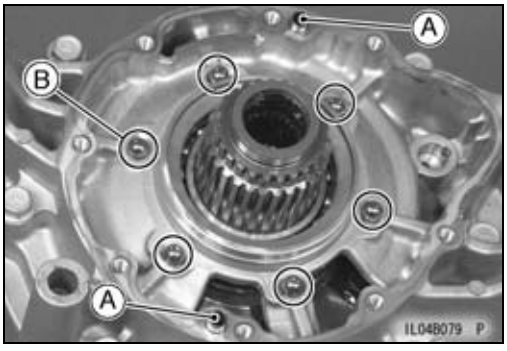


- Apply a non-permanent locking agent to the pinion gear bearing holder [A], but do not apply a non-permanent locking agent to one pitch [B] from the tip.
- Install the pinion gear bearing holder so that the no coating side [C] faces the bearing.
- Tighten:

Torque - Pinion Gear Bearing Holder: 250 N·m (25.5 kgf·m, 184 ft·lb)



- Install:
  Dowel Pins [A]
  Steel Balls [B]



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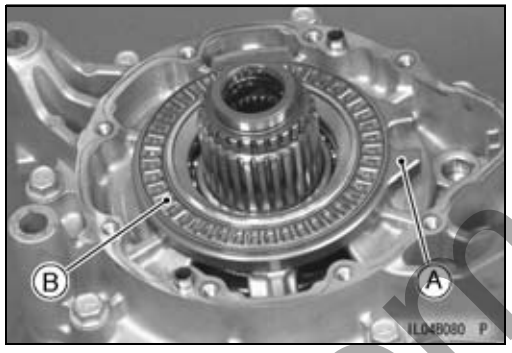
Front Final Gear Case

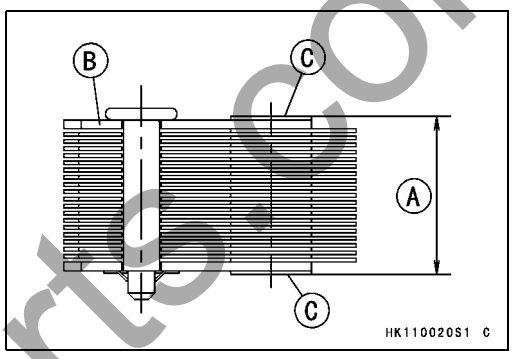
● Install:
Cam Lever [A]
Needle Bearing [B]
● Apply engine oil to the needle bearing.



● Check the wear of the disc assembly as follows.
○Measure the width [A] of the disc assembly [B] at three locations, and calculate average for three points.

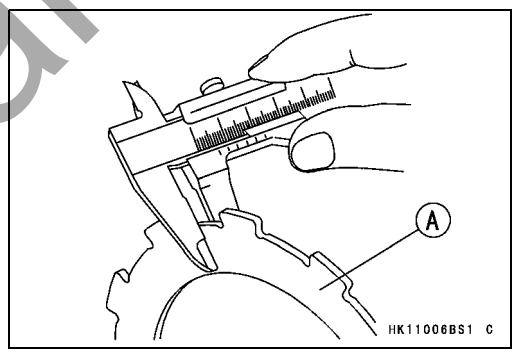
NOTE

○*Be careful not to damage the facing surface [C] on the outer plates.*



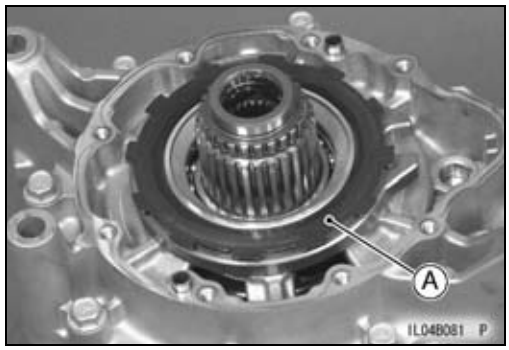
● Select the inner disc in accordance with the width of the disc assembly, refer to the below table.

Width of Disc Assembly	Thickness of Inner Disc [A]	Part Number
16.7 ~ 17.3 mm (0.6675 ~ 0.6811 in.)	2.4 mm (0.0945 in.)	41080-1501
17.31 ~ 17.9 mm (0.6815 ~ 0.7047 in.)	1.8 mm (0.0709 in.)	41080-1500
17.91 ~18.5 mm (0.7051 ~ 0.7283 in.)	1.2 mm (0.0472 in.)	41080-1499



★If the width is within the specified range, install the inner disc and disc assembly.
★If the width is not within the specified range, replace the disc assembly.

● Install:
Inner Disc [A]



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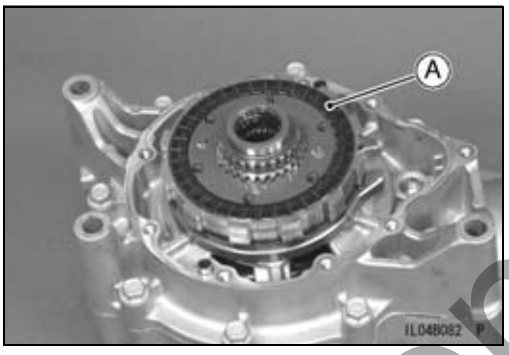
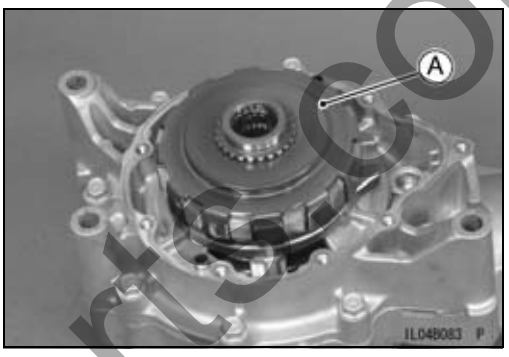
Front Final Gear Case

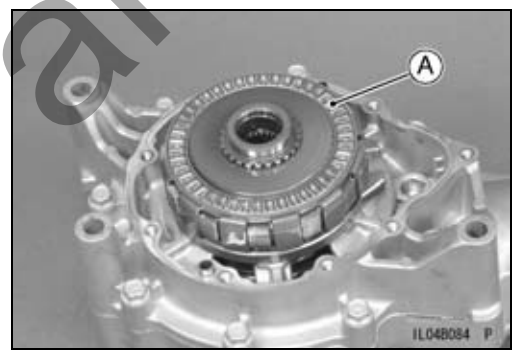
- Install:
  Disc Assembly [A]



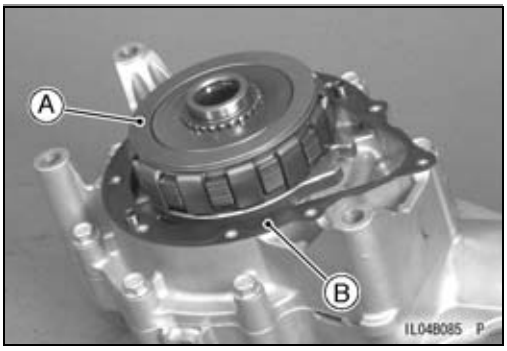
- Install:
  Housing [A]



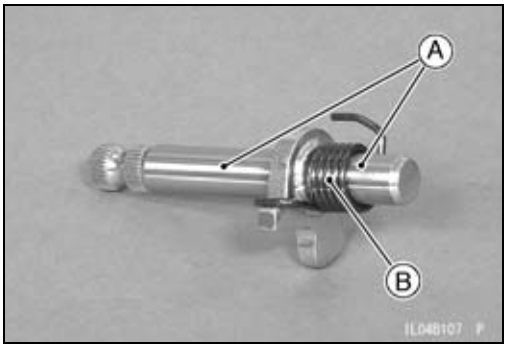
- Apply engine oil to the needle bearing [A].
- Install:
  Needle Bearing



- Install:
  Outer Disc [A]
  New Gasket [B]



- Apply engine oil to the differential control shift shaft [A].
- Install the spring [B] as shown in the figure.



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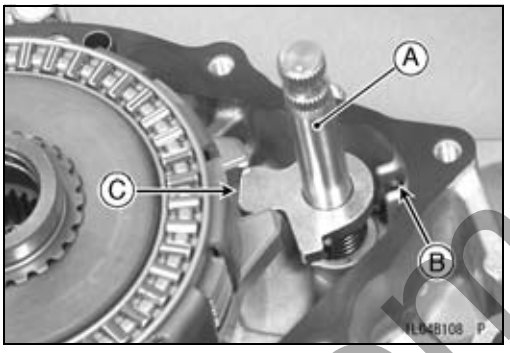
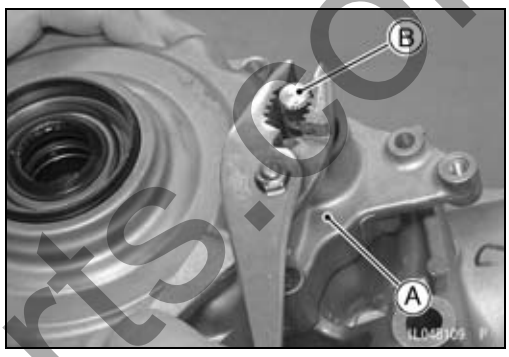
Front Final Gear Case

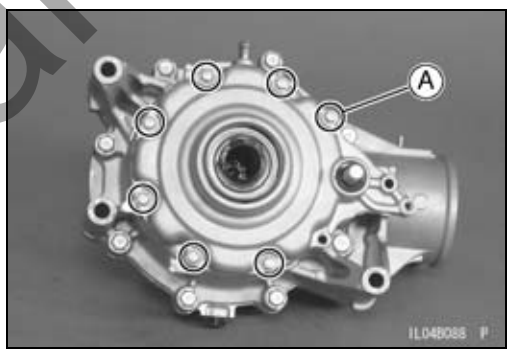
● Install the shaft [A] and spring in the front final gear case as shown in the figure.
○Insert the spring end into the slit [B] and insert the tab of the shift shaft into the groove [C] of the cam plate.



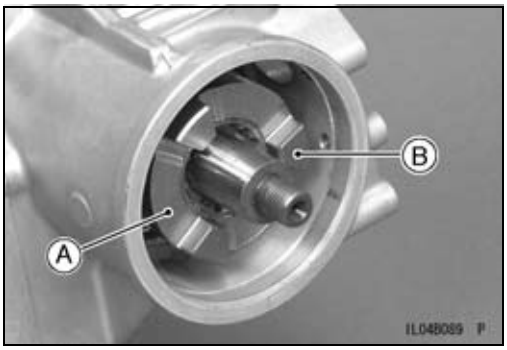
● Install:
Front Final Gear Case Left Cover [A]
○To fix the cover turn the shaft [B] counterclockwise.



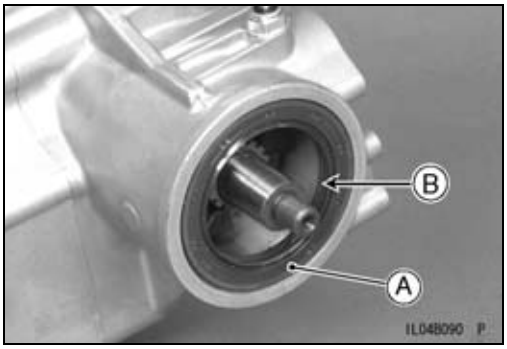
● Tighten:
Torque - Front Final Gear Case Left Cover Bolts (M6) [A]: 8.8 N·m (0.90 kgf·m, 78 in·lb)
L = 35 mm (1.4 in.)



● Apply grease to the shifter splines and groove.
● Install:
Shifter [A]
○Face the dogs side [B] to outside.



● Press the oil seal [A] in the front final gear case so that the oil seal surface is flush with the case end.
Special Tool - Oil Seal Driver: 57001-1715
● Apply grease to the oil seal lip [B].



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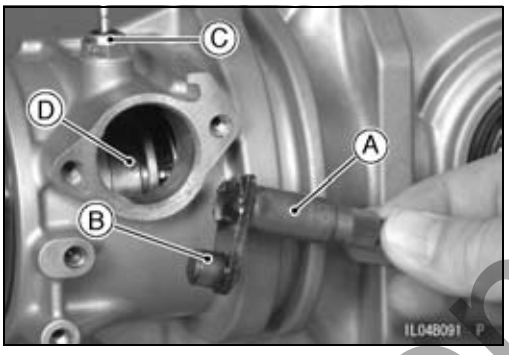
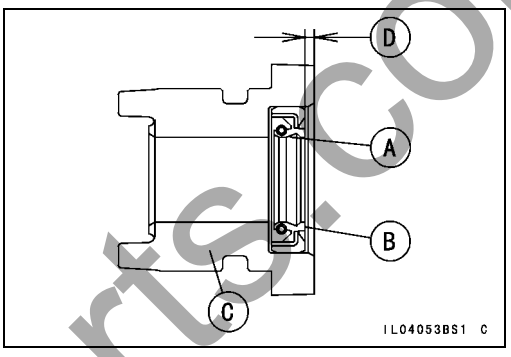
Front Final Gear Case

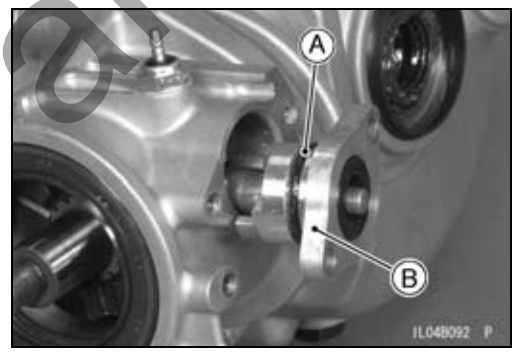
- Apply grease to the shaft [A] and pin [B] of the 2WD/4WD shift shaft lever.
- Insert the 2WD/4WD shift shaft lever so that the pin [B] is opposite side of the 2WD/4WD shift switch [C].
- Insert the pin into the groove [D] of the shifter.



- Apply grease to the oil seal lip [A].
- Press the oil seal [B] in the 2WD/4WD shift shaft cover [C] as shown in the figure.
  0.5 ~ 1.5 mm (0.020 ~ 0.059 in.) [D]

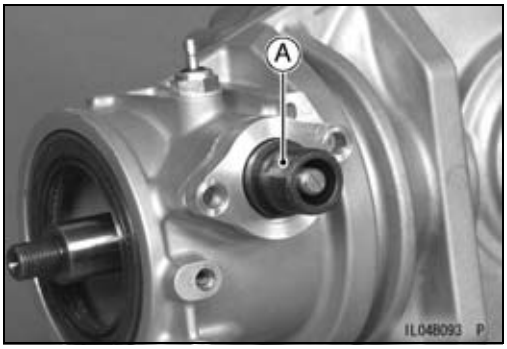


- Apply grease to the O-ring [A].
- Install:
  2WD/4WD Shift Shaft Cover [B]



○When installing the cover, use the oil seal guide [A] for protecting the oil seal.

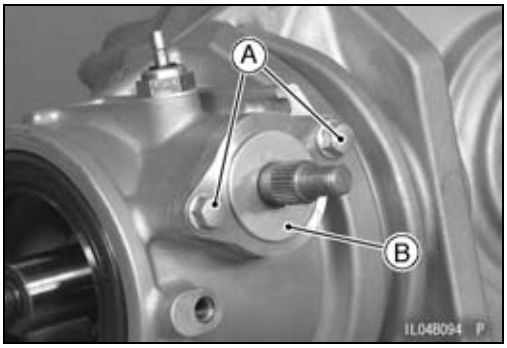
Special Tool - Oil Seal Guide: 57001-1721



- Apply a non-permanent locking agent to the threads of the shift shaft cover bolts [A] and tighten them.

Torque - 2WD/4WD Shift Shaft Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

- Install:
  Washer [B]



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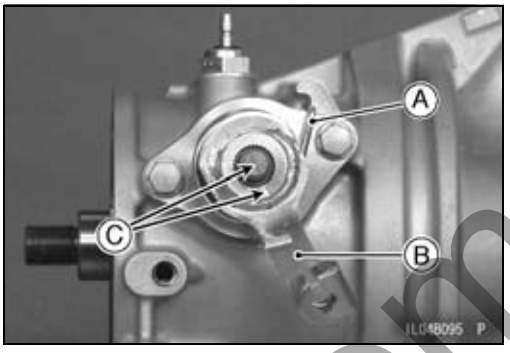
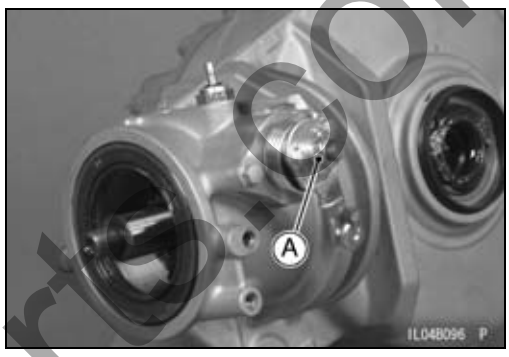
Front Final Gear Case

● Install:
Spring [A]
2WD/4WD Shift Shaft Lever [B]
● Align the lines [C] of the shaft and lever.

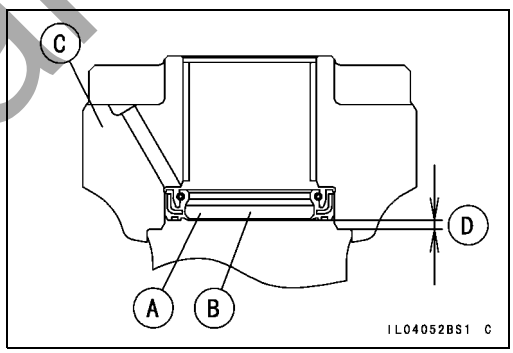


● Install:
2WD/4WD Shift Shaft Lever Nut [A]
● Tighten:

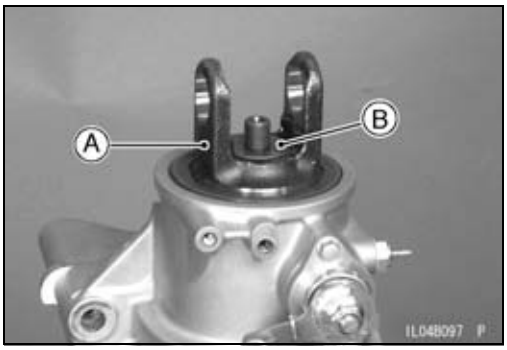
Torque - 2WD/4WD Shift Shaft Lever Nut: 20 N·m (2.0 kgf·m, 15 ft·lb)



● Apply grease to the oil seal lip [A].
● Press the oil seal [B] in the coupling [C] as shown in the figure.
1 ~ 1.5 mm (0.039 ~ 0.059 in.) [D]

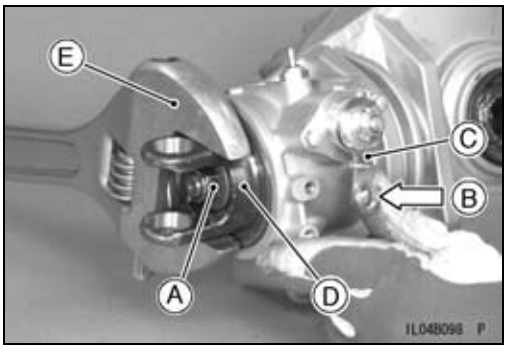


● Install:
Coupling [A]
Washer [B]



● Install:
Coupling Nut [A]
● Push [B] and hold the 2WD/4WD shift shaft lever [C].
● Hold the coupling [D] with a wrench [E].
● Tighten:

Torque - Coupling Nut: 35 N·m (3.6 kgf·m, 26 ft·lb)



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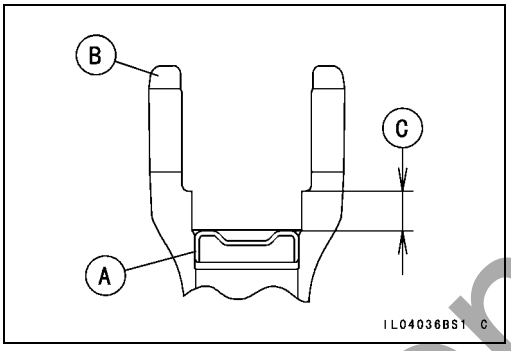
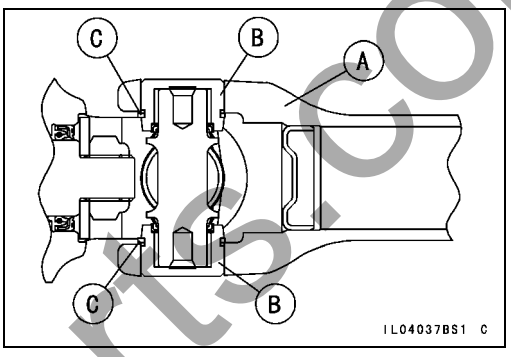
Front Final Gear Case

- Press the plug [A] into the yoke [B] as shown in the figure.
  10.5 ±1 mm (0.413 ±0.039 in.) [C]

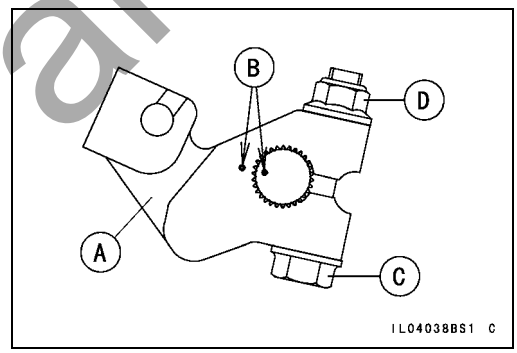


- Install:
  Yoke [A]
  Caps [B]
  New Snap Rings [C]



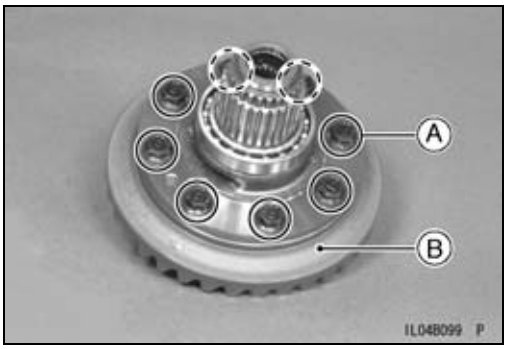
- Install:
  Differential Control Shift Shaft Lever [A]
- Align the punch marks [B] of the shaft and lever.
- Install:
  Differential Control Shift Shaft Lever Bolt [C] and Nut [D]
- Tighten:

Torque - Differential Control Shift Shaft Lever Nut: 8.8 N·m (0.90 kgf·m, 78 in·lb)

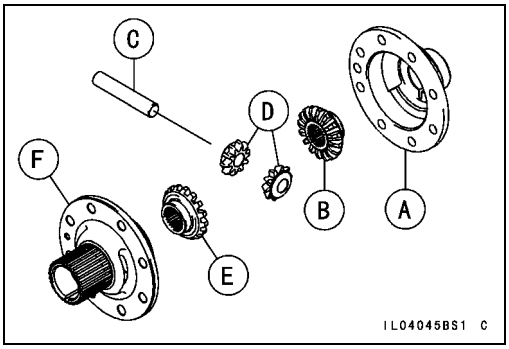


Ring Gear Disassembly

- Remove:
  Ring Gear Assembly (see Front Final Gear Case Disassembly)
  Ring Gear Bolts [A]
  Ring Gear [B]



- Remove:
  Differential Gear Case Cover [A]
  Right Side Gear (16T) [B]
  Spider Gear Shaft [C]
  Spider Gears (10T) [D]
  Left Side Gear (16T) [E]
  Left Differential Gear Case [F]



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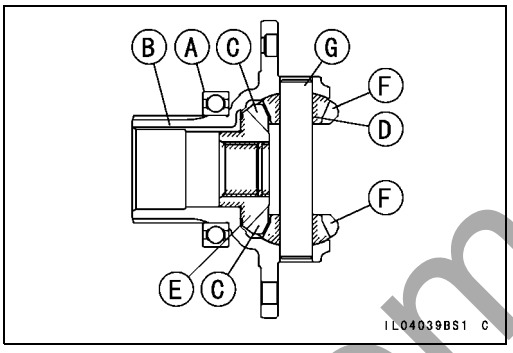
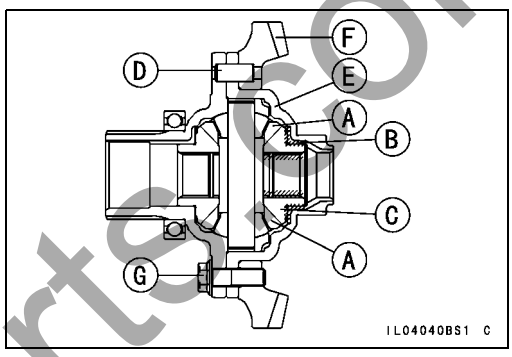
Front Final Gear Case

Ring Gear Assembly



- Press the bearing [A] on the left differential gear case [B] until it is bottomed.
- Apply engine oil to the teeth [C] of the gears.
- Apply molybdenum disulfide grease to the diagonal line parts [D].
- Install:
  Left Side Gear (16T)[E]
  Spider Gears (10T) [F]
  Spider Gear Shaft [G]



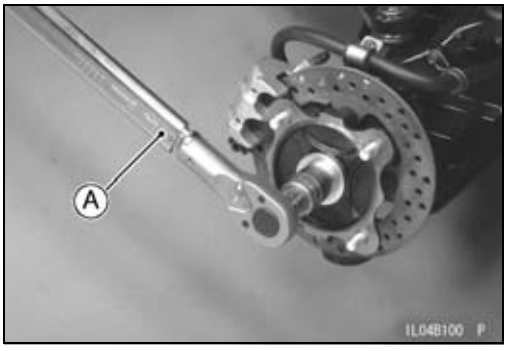
- Apply engine oil to the teeth [A] of the gear.
- Apply molybdenum disulfide grease to the diagonal line parts [B].
- Install:
  Right Side Gear (16T) [C]
  Pin [D]
  Differential Gear Case Cover [E]
  Ring Gear [F]
- Apply a non-permanent locking agent (Three Bond: TB2471 Blue) to the ring gear bolts [G], and tighten them.

Torque - Ring Gear Bolts: 57 N·m (5.8 kgf·m, 42 ft·lb)

LSD Clutch Torque Inspection

★If the vehicle has the following symptoms, check the LSD (Limited Slip Differential) clutch torque.
-The steering wheel is hard to turn.
-The front final gear case overheats.
-Abnormal noises come from the front final gear case when rounding a curve.

- Ensure 2WD mode.
- Support the vehicle so that the front wheels are off the ground.
- Remove:
  Left Front Wheel (see Wheel Removal in the Wheels/Tires chapter)
  Front Axle Nut Cotter Pin



- Secure the right front wheel from rotating.
- Pull the differential shift lever (5 notches), and shift to the differential lock position.
- Measure the clutch torque using a torque wrench [A]. Turn the wrench evenly.

○The clutch torque is the mean torque reading during about a quarter turn of the wrench.

LSD Clutch Torque
Standard: 300 N·m (31 kgf·m, 221 ft·lb) or more

★If the clutch torque is out of the specified range, check the width of the disc assembly (see Front Final Gear Case Assembly).

NOTE

○*The correct type of oil must be installed.*

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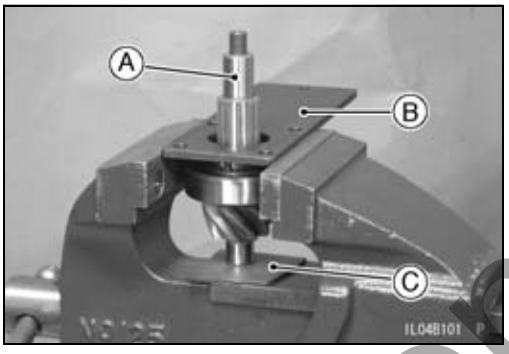
Front Final Gear Case

Pinion Gear Unit Disassembly

- Remove:
  Pinion Gear Unit (see Front Final Gear Case Disassembly)
- Hold the pinion gear unit [A] with the socket wrench [B] in a vise and put the rubber mat [C] (1 mm or more) at the bottom of the unit.

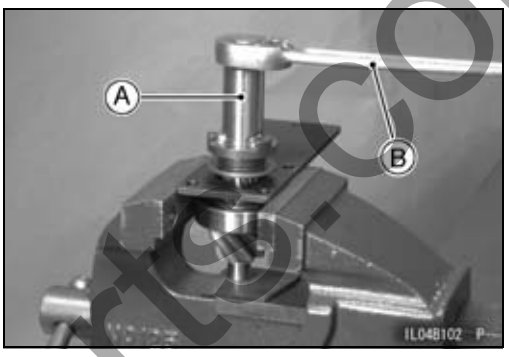
Special Tool - Socket Wrench: 57001-1363



- Loosen the pinion gear bearing holder nut a little with the pinion gear holder [A].

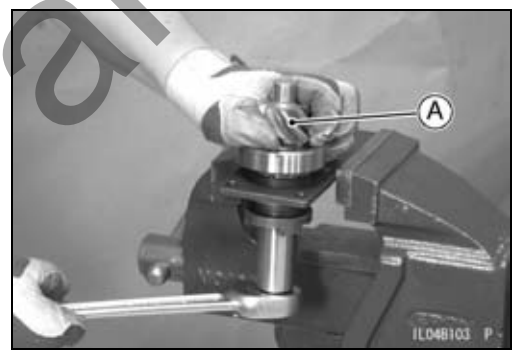
Special Tool - Pinion Gear Holder: 57001-1708

○Turn the wrench [B] clockwise a little.



- Set the pinion gear unit [A] upside down in a vise as shown in the figure.
- Hold the pinion gear unit and remove the pinion gear bearing holder nut.
- Remove the ball bearing if required.

Special Tool - Bearing Puller: 57001-135

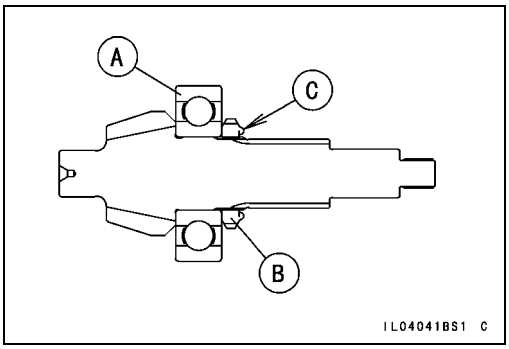


Pinion Gear Unit Assembly

- Visually inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a bearing, replace the bearing.

- Be sure to check and adjust the bevel gear backlash and tooth contact, when any of the backlash-related parts are replaced (see Front Final Bevel Gear Adjustment).
- Press the ball bearing [A] on the pinion gear until it is bottomed.
- Apply a non-permanent locking agent (Three Bond: TB2471 Blue) to the pinion gear bearing holder nut [B].
- Install the pinion gear bearing holder nut so that the projection [C] faces outward.



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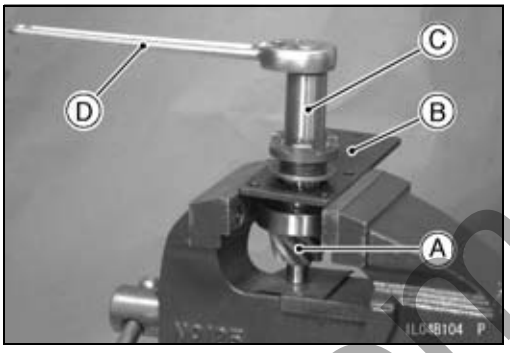
Front Final Gear Case

● Hold the pinion gear unit [A] with the socket wrench [B] in a vise (see Pinion Gear Unit Disassembly).

Special Tools - Socket Wrench: 57001-1363
Pinion Gear Holder [C]: 57001-1708

● Turn the wrench [D] counterclockwise and tighten the nut.

Torque - Pinion Gear Bearing Holder Nut: 200 N·m (20.4 kgf·m, 148 ft·lb)



Front Final Bevel Gear Adjustment

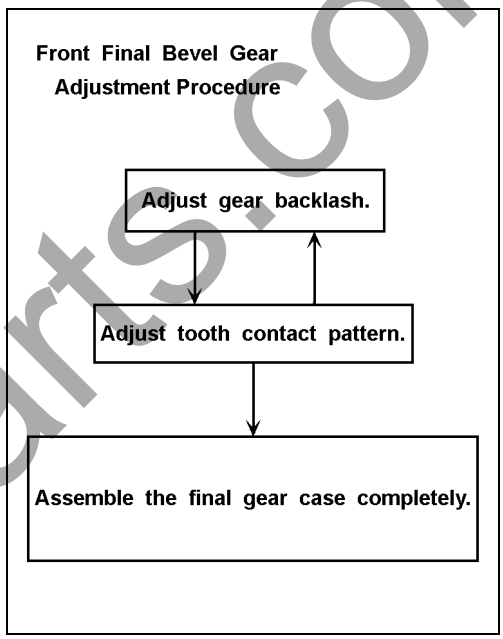
The **backlash** (distance one gear will move back and forth without moving the mate gear) and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

Above two adjustments are of critical importance and must be carried out following the correct sequence and method.

● When any one of the backlash-related parts are replaced, check and adjust the bevel gear backlash, and tooth contact by replacing shims.

○The amount of backlash is influenced by the ring gear position more than by the pinion gear position.

○Tooth contact location is influenced by the pinion gear position more than by the ring gear position.



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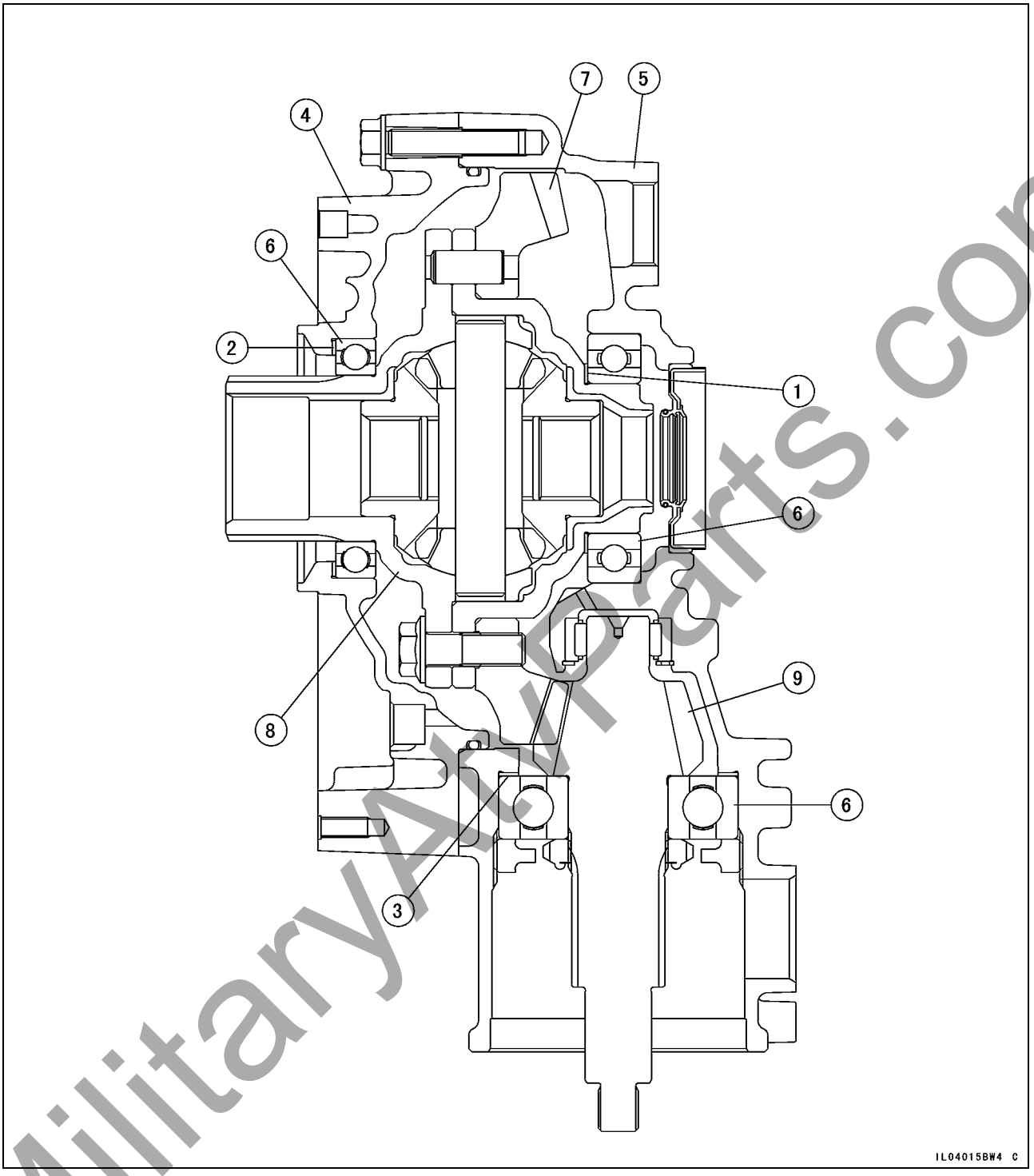
Front Final Gear Case

Front Final Gear Case (Backlash-related Parts)



1. Ring Gear Right Shim(s)
2. Ring Gear Left Shim(s)
3. Pinion Gear Shim(s)
4. Front Final Gear Case Center Cover
5. Front Final Gear Case Right Cover
6. Ball Bearings
7. Ring Gear
8. Ring Gear Assembly
9. Pinion Gear

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Front Final Gear Case

1. Ring Gear Right Shims for Backlash Adjustment

Thickness	Parts Number
0.15 mm (0.006 in.)	92180-0260
0.2 mm (0.008 in.)	92180-0261
0.5 mm (0.020 in.)	92180-1207
0.8 mm (0.031 in.)	92180-0259
1.0 mm (0.039 in.)	92180-1205
1.2 mm (0.047 in.)	92180-0262

2. Ring Gear Left Shims for Backlasht Adjustment

Thickness	Parts Number
0.15 mm (0.006 in.)	92180-1390
0.2 mm (0.008 in.)	92180-1391
0.5 mm (0.020 in.)	92180-1392
0.7 mm (0.028 in.)	92180-1393
0.8 mm (0.031 in.)	92180-1394
0.9 mm (0.035 in.)	92180-1395
1.0 mm (0.039 in.)	92180-1396
1.1 mm (0.043 in.)	92180-1397
1.2 mm (0.047 in.)	92180-1398

3. Pinion Gear Shims for Tooth Contact Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1423
0.2 mm (0.008 in.)	92180-1424
0.5 mm (0.020 in.)	92180-1425
0.8 mm (0.031 in.)	92180-1426
1.0 mm (0.039 in.)	92180-1427
1.2 mm (0.047 in.)	92180-1428

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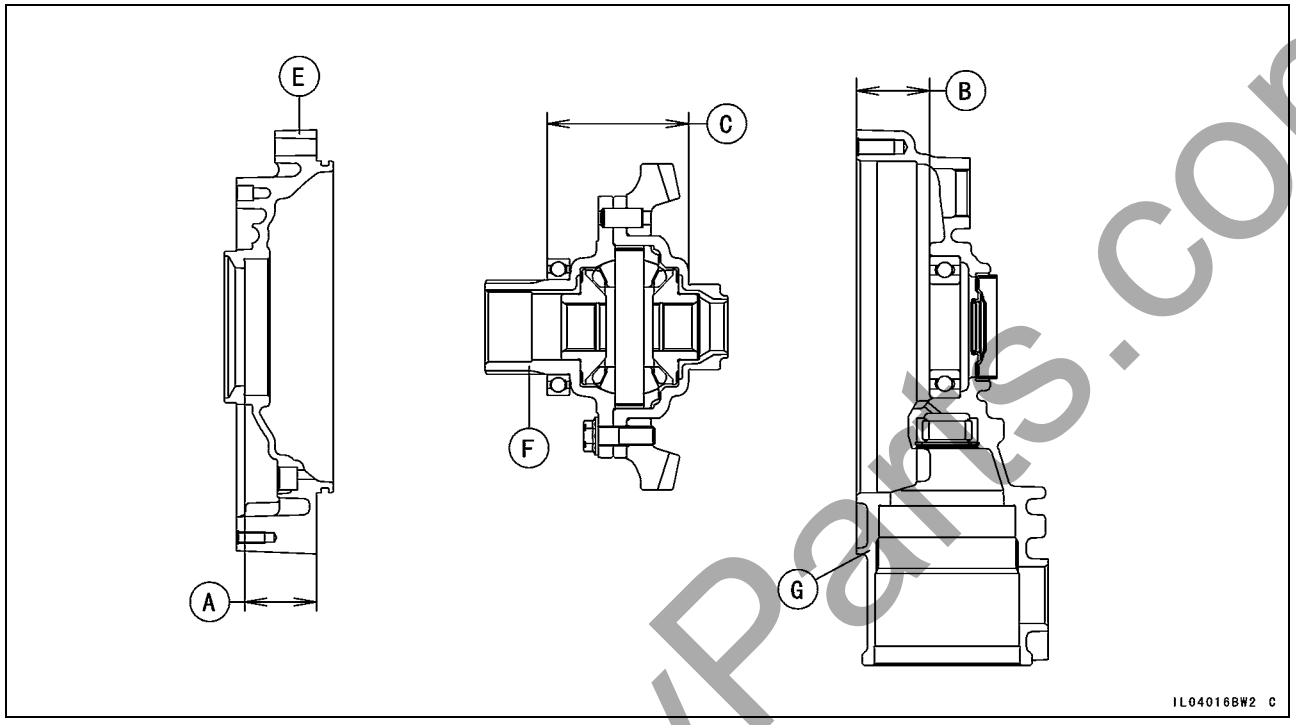
Front Final Gear Case

Front Final Gear Case Backlash Adjustment

- Clean dirt and oil off bevel gear teeth.
- Measure length [A], [B] and [C], and calculate the clearance [D] between the ring gear assembly and gear case covers.

  [D] = [A] + [B] – [C]



[E] Front Final Gear Case Center Cover
[F] Ring Gear Assembly
[G] Front Final Gear Case Right Cover

- Assemble the front final gear case (see Front Final Gear Case Assembly).

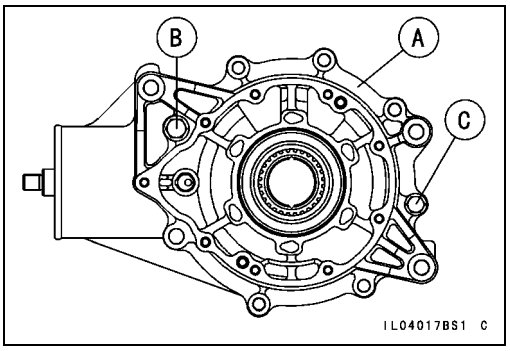
○It is not necessary to install the variable front differential control unit.

○When installing the pinion gear bearing holder, a non-permanent locking agent is not used.

○Use the following two spare bolts when installing the front final gear case center cover [A].

M10 Bolt [B] L = 35 mm (1.38 in.), P = 1.25 mm (0.049 in.)

M8 Bolt [C] L = 40 mm (1.57 in.), P = 1.25 mm (0.049 in.)



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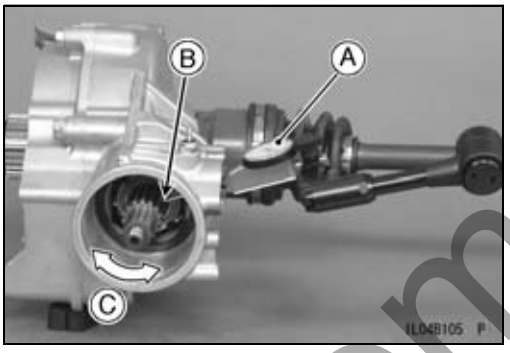
Front Final Gear Case



- Temporarily install the right front axle in the gear case and hold it in a vise.
- Mount a dial gauge [A] so that the tip of the gauge is against the splined portion [B] of the pinion gear shaft.
- To measure backlash, turn the pinion gear shaft right and left [C] while holding the front axle steady. The difference between the highest and lowest gauge reading is the amount of backlash.

○Measure backlash at three locations (equally spaced on the splines).

Front Final Bevel Gear Backlash

Standard: 0.08 ~ 0.16 mm (0.003 ~ 0.006 in.) (at pinion gear spline)

★If the backlash is not within the standard, replace the ring gear shims according to the below NOTE. To increase backlash, increase the thickness of the shim(s) [1] and decrease the thickness of the shim(s) [2]. To decrease backlash, decrease the thickness of the shim(s) [1] and increase the thickness of the shim(s) [2].

NOTE

○*The total of the ring gear shims, [1] and [2], should be less than [D] (the clearance between the ring gear assembly and gear case covers).*

○*Example:*

D = 2.34 mm →[1] + [2] = 2.30 mm

D = 2.26 mm →[1] + [2] = 2.25 mm

○The second decimal of the total of [1] and [2] should be .x0 or .x5 nearest of D.

- Recheck the backlash, and readjust if necessary.

Front Final Gear Case Tooth Contact Adjustment

- Clean any dirt and oil off the bevel gear teeth.
- Apply checking compound to 4 or 5 teeth on the pinion gear.

NOTE

○*Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*

○*The checking compound must be smooth and firm, with the consistency of tooth paste.*

○*Special compounds are available at automotive supply stores for the purpose of checking differential gear tooth patterns and contact. Use one of these for checking the bevel gears.*

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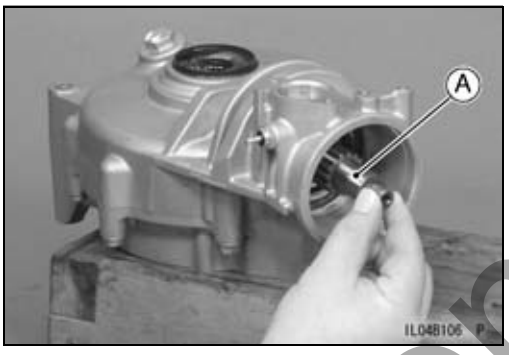
Front Final Gear Case

- Assemble the front final gear case (see Front Final Gear Case Backlash Adjustment).
- Turn the pinion gear shaft [A] for one revolution in the drive and reverse (coast) direction, while creating a drag on the ring gear.
- Remove the ring gear and pinion gear unit to check the drive pattern and coast pattern of the bevel gear teeth.



○The tooth contact patterns of both (drive and coast) sides should be centrally located between the top and bottom of the tooth. The drive pattern can be a little closer to the toe and the coast pattern can be a somewhat longer and closer to the toe.

★If the tooth contact pattern is incorrect, replace the pinion gear shim(s), following the examples shown.

- Then erase the tooth contact patterns and check them again. Also check the backlash every time the shim(s) are replaced. Repeat the shim change procedure as necessary.

NOTE

○*If the backlash is out of the standard range after changing the pinion gear shim(s), change the ring gear shim(s) to correct the backlash before checking the tooth contact pattern.*

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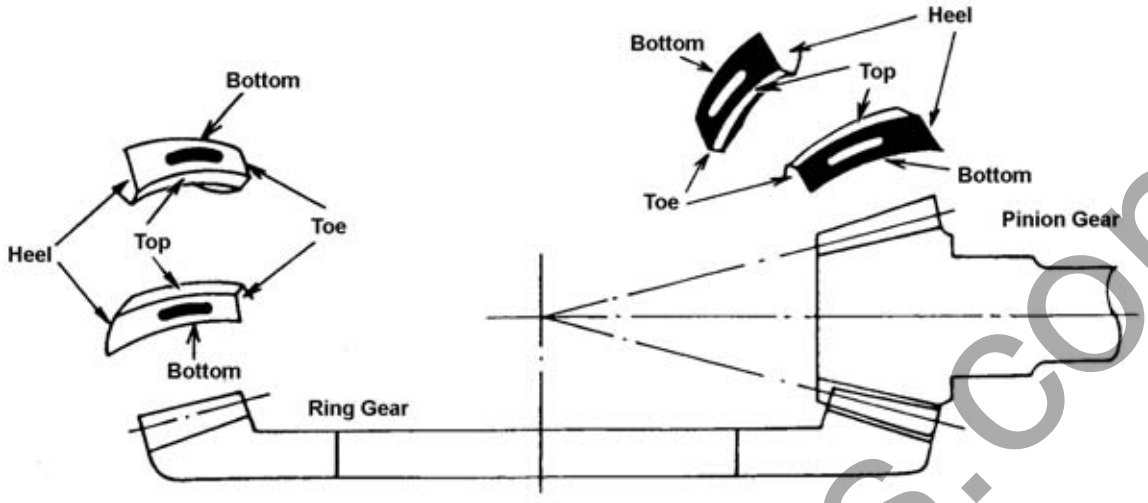
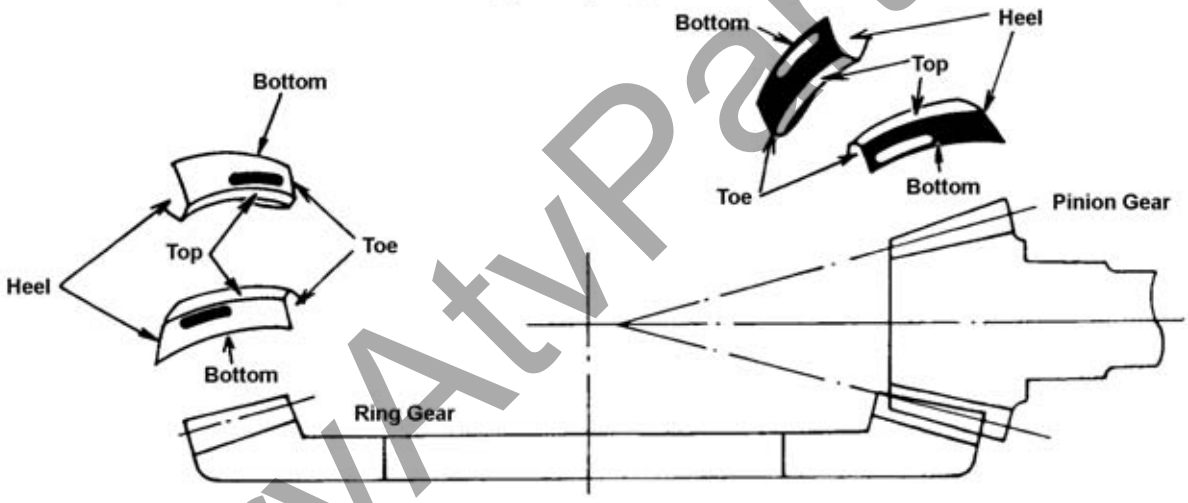
Front Final Gear Case

Correct Tooth Contact Pattern: No adjustment is required.

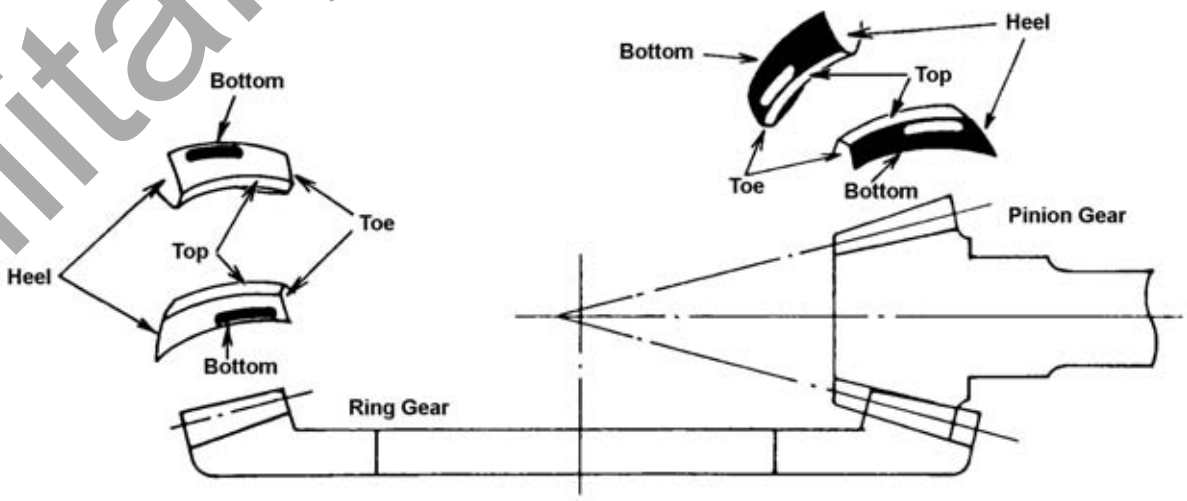


Incorrect Tooth Contact Patterns

Example 1 : Decrease the thickness of the pinion gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



Example 2 : Increase the thickness of the pinion gear shim(s) by 0.1 mm (0.004 in.) to correct the pattern shown below. Repeat in 0.1 mm (0.004 in.) steps if necessary.



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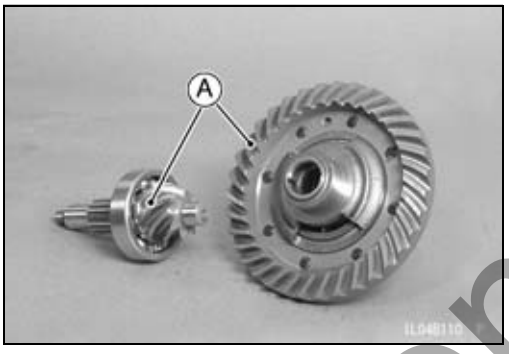
Front Final Gear Case

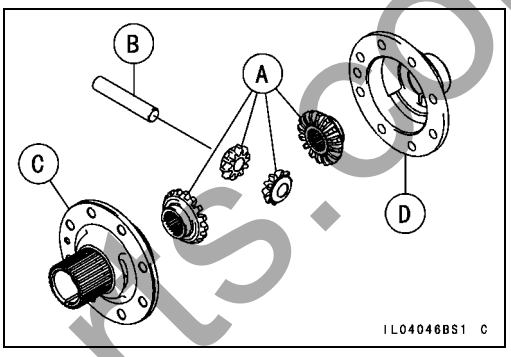
Bevel Gear Inspection



- Visually check the bevel gears [A] for scoring, chipping, or other damage.

★Replace the bevel gears as a set if either gear is damaged.

Differential Gear Inspection



- Visually check the differential gears [A] for scoring, chipping, or other damage.

★Replace the differential gears as a set if either gear is damaged.

- Also, inspect the differential gear shaft [B], gear case [C], and cover [D] where the differential gears rub.

★If they are scored, discolored, or otherwise damaged, replace them as a set.

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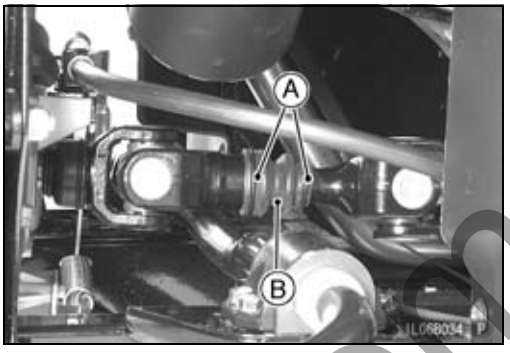
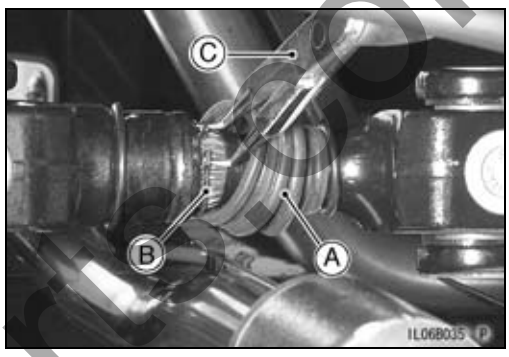
Rear Propeller Shaft

Rear Propeller Shaft Removal

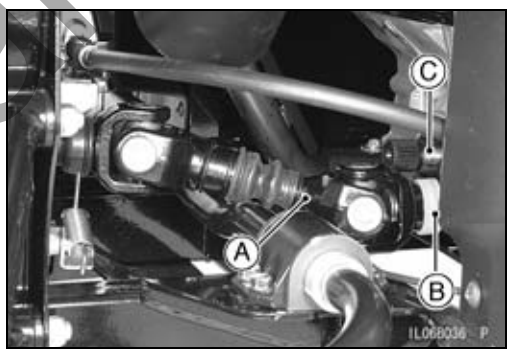
- Remove:
  Right Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)
- Slip the O-rings [A] off the grooves on the rubber boot [B].



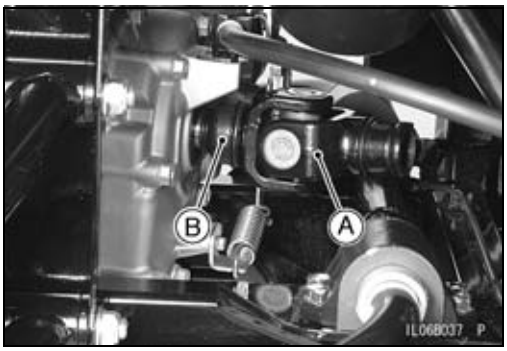
- Slide the boot [A] forward, and remove the circlip [B] with a suitable commercially circlip pliers [C].



- Push the rear propeller shaft [A] rearward, and remove the front end [B] from the output bevel gear shaft [C].
- Remove the rear propeller shaft and spring from the vehicle.



- Remove:
  Universal Joint [A]
  Boot [B] and O-rings



Rear Propeller Shaft Installation

- Wipe off any old grease on the splines of the following parts.
  Output Bevel Gear Shaft
  Propeller Shaft
  Universal Joint
  Pinion Gear Shaft of Rear Final Gear Case
- Check the boots for damage.

★If any damage exists, replace it with a new one.

- Replace the O-rings with new ones.

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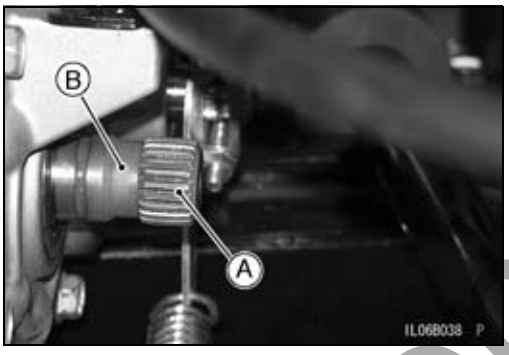
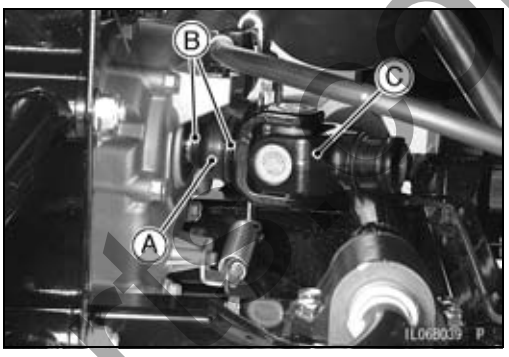
Rear Propeller Shaft

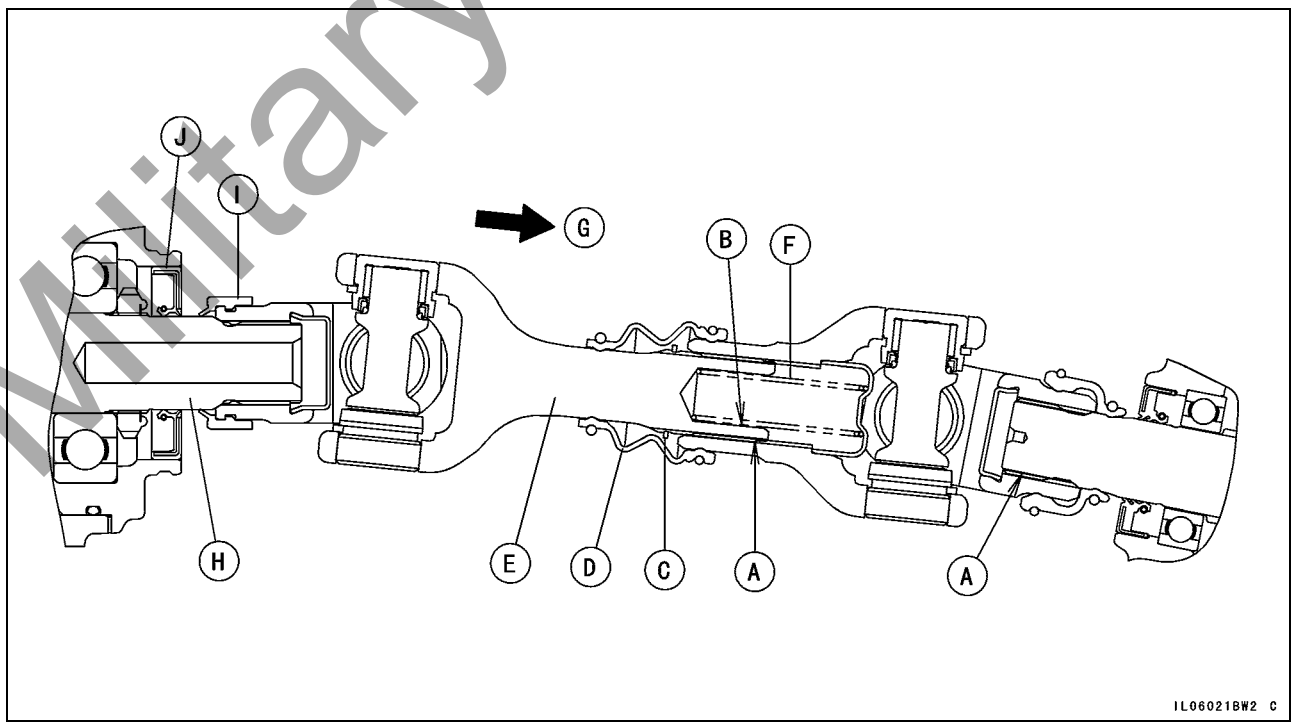
● Apply molybdenum disulfide grease to the splines [A] of the pinion gear shaft [B] of rear final gear case.



● Install:
Boot [A]
O-rings [B]
Universal Joint [C]



● Aooly molybdenum disulfide grease to the splines [A] and inside [B] of the rear propeller shaft.
● Install:
New Circlip [C] (on the Rear Propeller Shaft)
Boot [D] and New O-rings
Rear Propeller Shaft [E]
Spring [F]
● Align each yoke with the other yoke (see Front Propeller Shaft Installation).
● Push the rear propeller shaft rearward [G], and install the front end to the output bevel gear shaft [H].
● Install the circlip [C] into the groove of the propeller shaft.
○Do not contact the boot [I] and oil seal [J].



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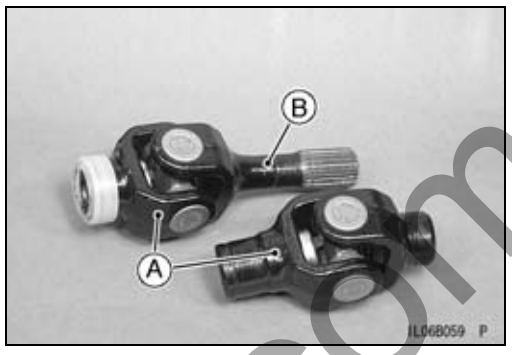
Rear Propeller Shaft

- Fit the boots into the grooves of the yoke and shaft.
- Fit the O-rings into the grooves of the boot.

Rear Propeller Shaft Inspection



- Remove:
  Rear Propeller Shaft (see Rear Propeller Shaft Removal)
- Check that the universal joint [A] works smoothly without rattling or sticking.

★If it does rattle or stick, the universal joint is damaged. Replace the universal joint.

- Check the splines of the propeller shaft [B] and universal joint.

★If the splines are twisted or damaged in any way, replace the damaged parts.

- Also, inspect the splines of output bevel gear shaft and pinion gear shaft of the rear final gear case.

★If the splines are badly worn, chipped, or loose, replace the damaged parts.

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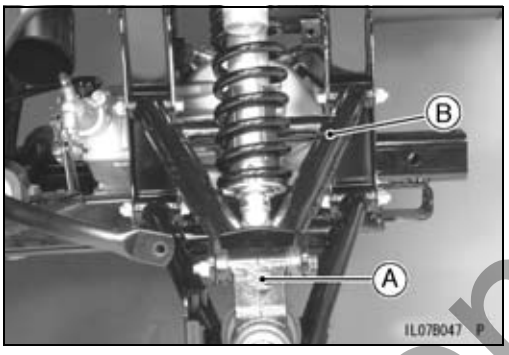
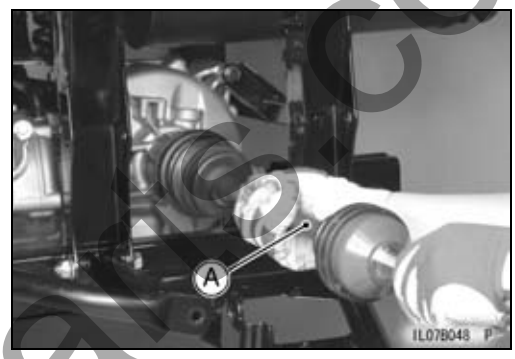
Rear Axle

Rear Axle Removal

- Drain the rear final gear case oil (see Rear Final Gear Case Oil Change in the Periodic Maintenance chapter).
- Remove:
  Rear Wheels (see Wheel Removal in the Wheels/Tires chapter)
  Stabilizer Joint (see Stabilizer Removal in the Suspension chapter)
  Rear Knuckle [A] (see Rear Knuckle Removal in the Suspension chapter)
  Upper Suspension Arm [B] (see Rear Suspension Arm Removal in the Suspension chapter)



- Pull the rear axle [A] in a straight line out of the rear final gear case.

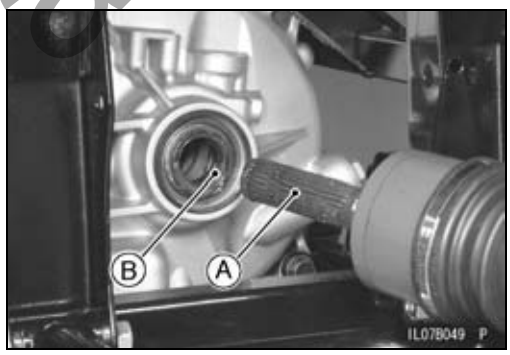


Rear Axle Installation

- Wipe off any old grease:
  Splines [A] of Axle
  Gear Case Oil Seal [B]
- Visually inspect the splines of the axle.

★If they are badly worn or chipped, replace the axle with a new one.

- Apply molybdenum disulfide grease to the axle splines.
- Apply grease to the gear case oil seal lips.



- Push [A] the end of the rear axle straight and install the rear axle.

NOTE

○*The axle shaft must not come off easily.*

Rear Axle Joint Boot Inspection

- Refer to the Axle Joint Boot Inspection in the Periodic Maintenance chapter.

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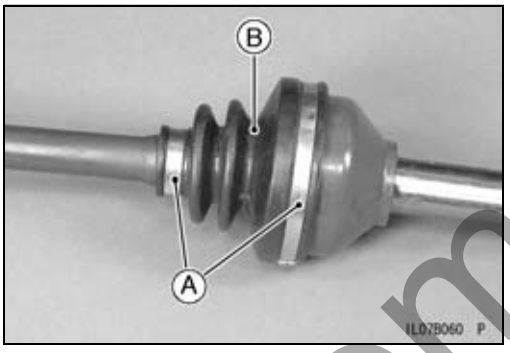
Rear Axle

Rear Axle Joint Boot Replacement

Outboard Joint Boot Removal

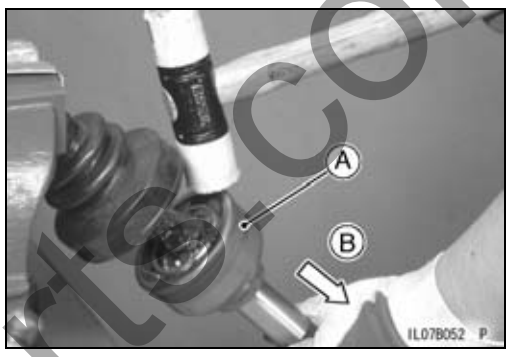
- Remove:
  Rear Axle (see Rear Axle Removal)
  Boot Bands [A]
- Scrap the removed boot bands.
- Slide the joint boot [B] toward the inboard joint.



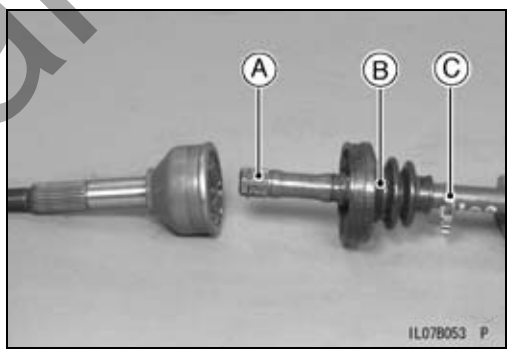
- Tap the bearing housing [A] straight [B] with a plastic hammer to separate it from the shaft.

NOTICE

Do not tap on the cage. Be careful not get hurt when the housing comes out. If the splined portion of shaft cracked or damaged during disassembling of outboard joint, do not reuse the shaft.



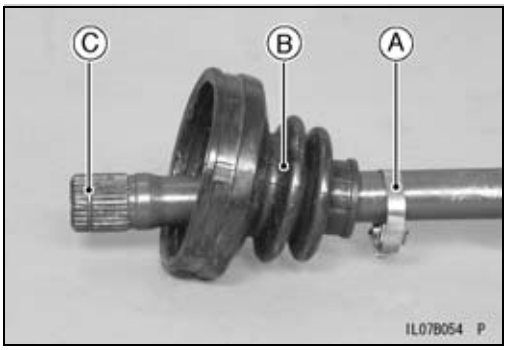
- Remove:
  Circlip [A]
  Boot [B]
  Small Band [C]



Outboard Joint Boot Installation

- Clean the axle shaft by wiping off the used grease on it.
- Wind the tape on the splines of the axle shaft in order to protect the joint boot.
- Install:
  New Small Band [A]
  New Boot [B]

○Apply the special grease slightly on the inside of the new boot small diameter, and install the boot on the axle shaft.



NOTICE

Only the special grease that is included with the boot kit can be applied to the boots.

- Install:
  New Circlip [C]

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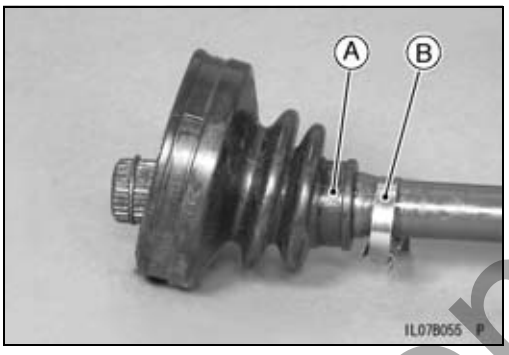
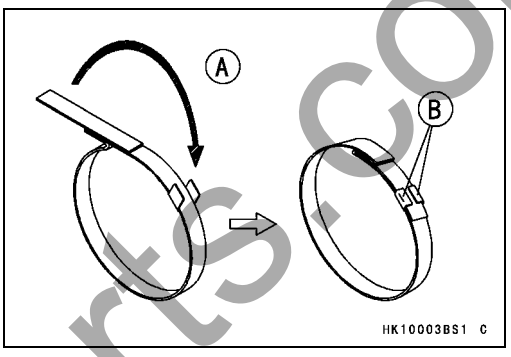
Rear Axle

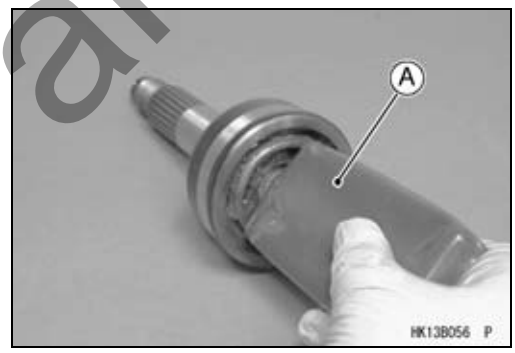
- Apply the special grease slightly on the part [A] of the band installation in order to make easy to install the boot band.
- Tighten the small boot band [B].



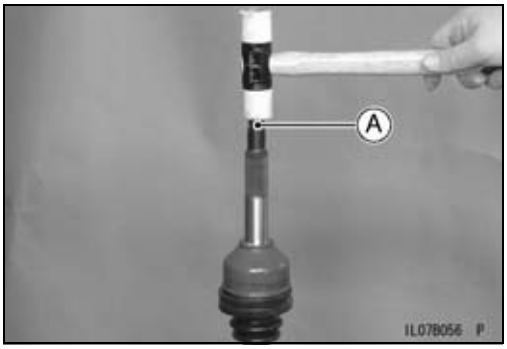
○Tighten the boot band [A] and bend the tangs [B] securely to hold down the end of the band.



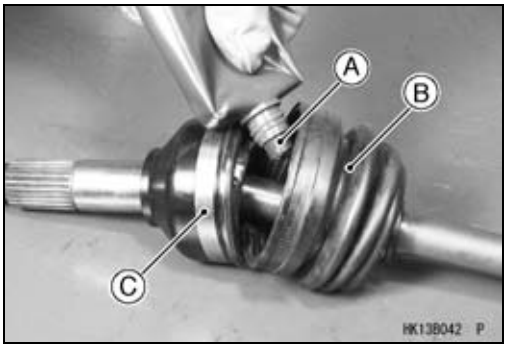
- Place the special grease tube nozzle in the bore of the housing and squeeze the tube [A] until the grease comes out from the joint bearing.



- Tap the shaft end [A] straight with a plastic hammer until it is locked by the circlip.



- Squeeze all of the special grease [A] into the new boot [B], and slide the boot onto the outboard joint [C].



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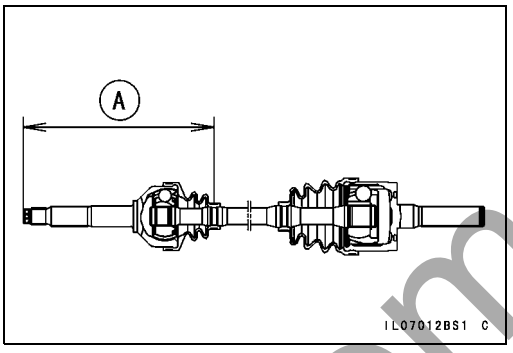
Rear Axle

- Compress the axle assembly to the specified length while relieving the air pressure inside the outboard boot.
- Hold the axle at this setting.

Standard Length of Assembling:
Outboard: 228.9 mm (9.01 in.) [A]

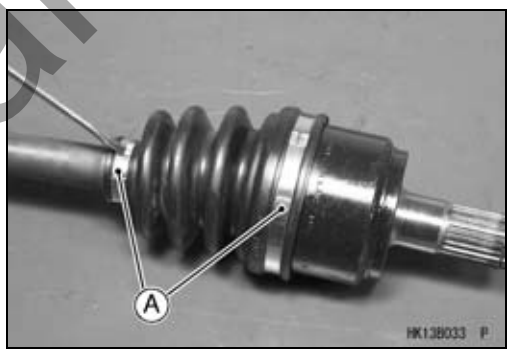


- Open the edge of the boot in order to equalize the air pressures.
- Tighten the large band [A] and tap down the tangs securely to hold down the end of the band.
- Be sure outside diameter of the band is less than the maximum diameter.

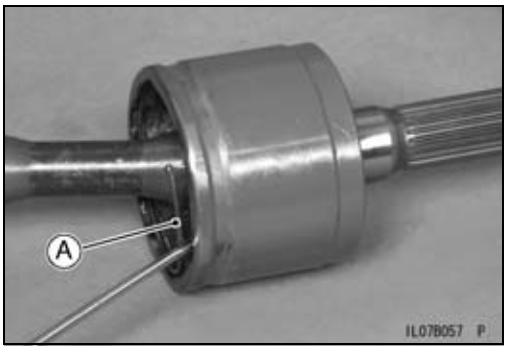
Maximum Outside Diameter of Band: 85.3 mm (3.36 in.)

Inboard Joint Boot Removal

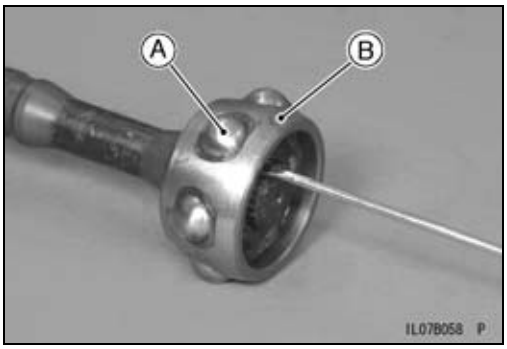
- Remove:
  Rear Axle (see Rear Axle Removal)
  Boot Bands [A]
- Scrap the removed boot bands.
- Slide the joint boot toward the outboard joint.



- Remove the retaining ring [A].
- Separate to the axle shaft.



- Remove the steel balls [A].
- Slide the cage [B] toward the outboard joint.



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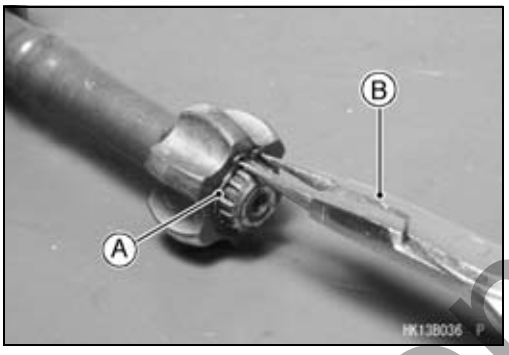
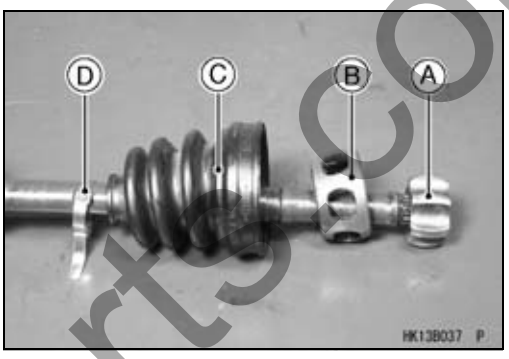
Rear Axle

● Remove:
Circlip [A]

Special Tool - Outside Circlip Pliers [B]: 57001-144

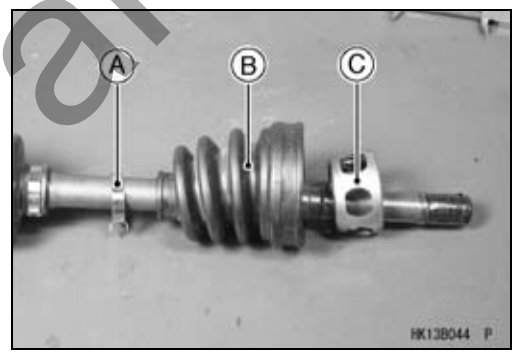


● Remove:
Inner Race [A]
Cage [B]
Inboard Joint Boot [C]
Boot Band [D]

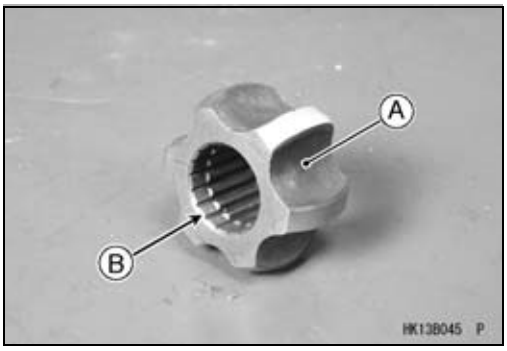


Inboard Joint Boot Installation

● Install:
New Small Band [A]
New Inboard Joint Boot [B]
Cage [C]



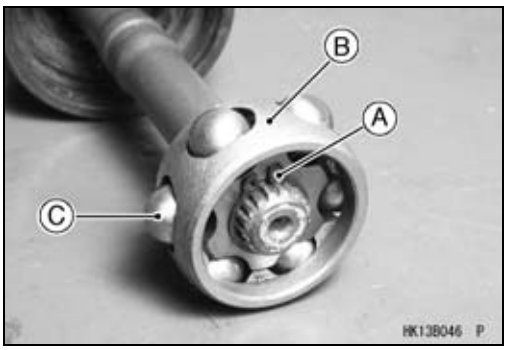
● Install the inner race [A] so that the flat serration side [B] faces outboard joint.



● Install:
Circlip [A]

Special Tool - Outside Circlip Pliers: 57001-144

● Slide the cage [B] on the inner race and install the steel balls [C].



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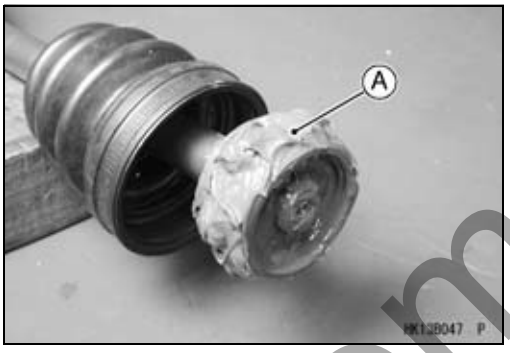
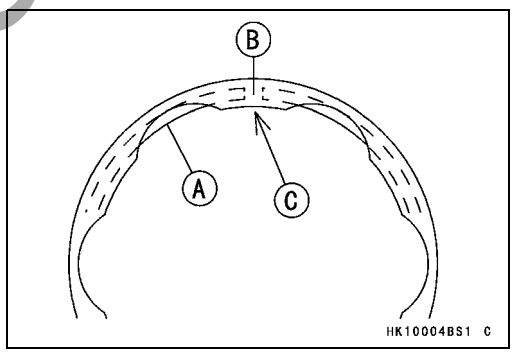
Rear Axle

- Apply the special grease [A] to the steel balls and cage.

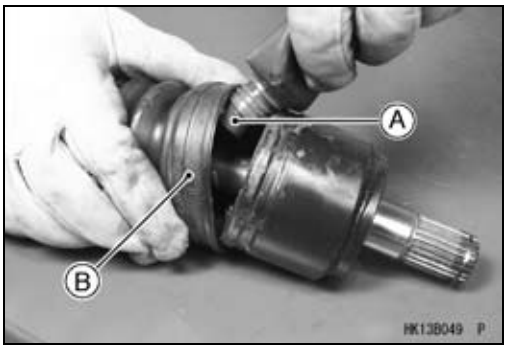


- Squeeze about half a tube of the special grease [A] into the bearing cup [B].

- Insert the balls and cage assembly in the bearing cup strongly.
- Install the new retaining ring [A] so that the opening [B] is aligned with one of the projections [C].



- Tighten the small band.
- Squeeze the remaining special grease [A] into the inboard joint boot [B].



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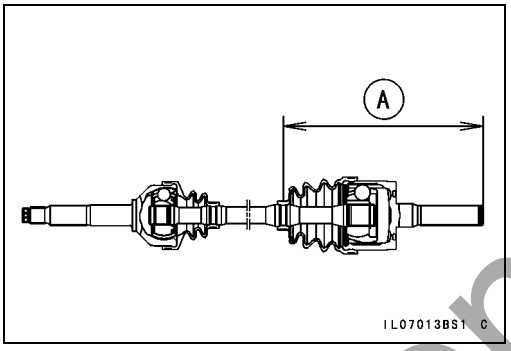
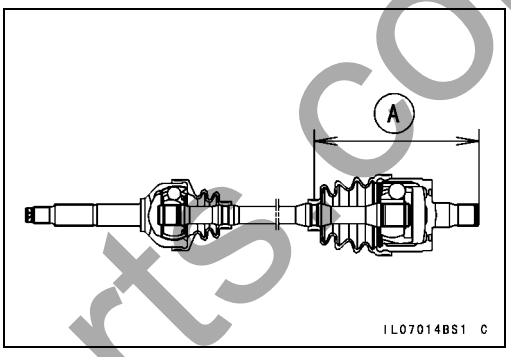
Rear Axle

- Compress the axle assembly to the specified length while relieving the air pressure inside the inboard boot.
- Hold the axle at this setting.

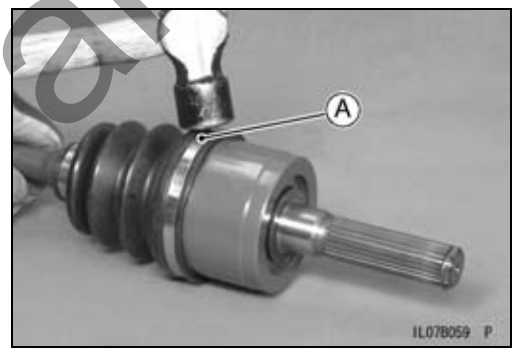
Standard Length of Assembling:
Left Rear Axle: 244.3 mm (9.62 in.) [A]



Right Rear Axle: 193.8 mm (7.63 in) [A]

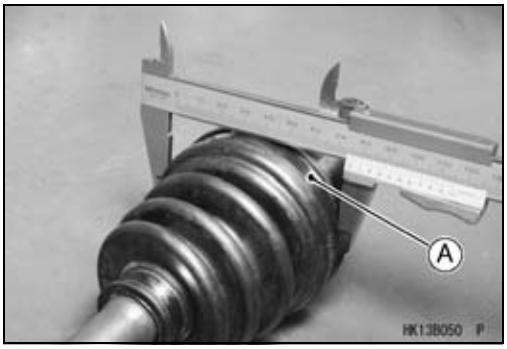


- Open the edge of the boot in order to eqalize the air pressures.
- Tighten the large band [A] and tap down the tangs securely to hold down the end of the band.



- Be sure outside diameter of the band [A] is less than the maximum diameter.

Maximum Outside Diameter of Band: 94.6 mm (3.72 in.)



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Rear Final Gear Case

Rear Final Gear Case Oil Level Inspection

- Park the vehicle so that it is level, both side-to-side and front-to-rear.
- Remove the filler cap.

NOTICE

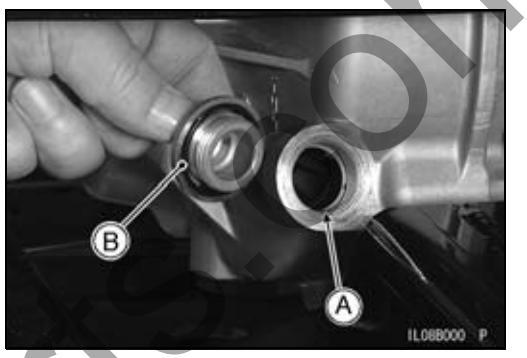
Be careful not to allow any dirt or foreign materials to enter the gear case.

- Check the oil level. The oil level should come to the bottom of the filler opening [A].

★If it is insufficient, first check the rear final gear case for oil leakage, remedy it if necessary, and add oil through the filler opening. Use the same type and brand of oil that is already in the final gear case.

- Apply grease to the O-ring [B].
- Be sure the O-ring is in place.

Torque - Rear Final Gear Case Oil Filler Cap: 29 N·m (3.0 kgf·m, 21 ft·lb)



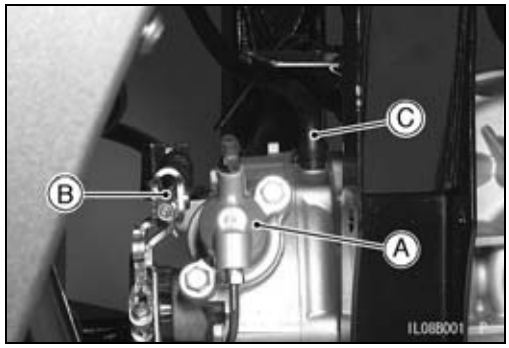
Rear Final Gear Case Oil Change

- Refer to the Rear Final Gear Case Oil Change in the Periodic Maintenance chapter.

Rear Final Gear Case Removal

- Remove:
  Rear Bottom Guard (see Rear Bottom Guard Removal in the Frame chapter)
  Rear Suspension Arm (see Rear Suspension Arm in the Suspension chapter)
  Rear Axles (see Rear Axle Removal)
  Rear Propeller Shaft (see Rear Propeller Shaft Removal)

- Remove:
  Rear Brake Master Cylinder [A] (see Rear Brake Master Cylinder Removal in the Brakes chapter)
  Brake Cable Rear End [B]
  Breather Hose [C]



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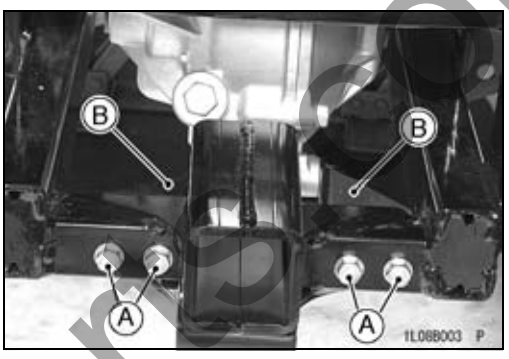
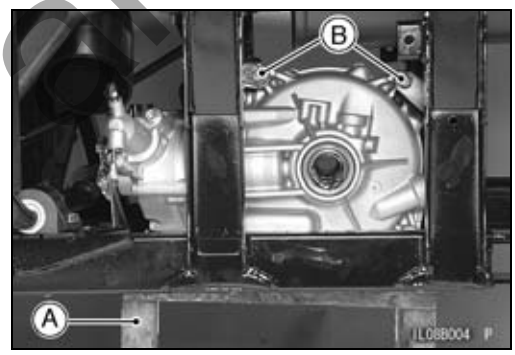
Rear Final Gear Case

- Remove:
  Rear Final Gear Case Bolt [A] and Nut

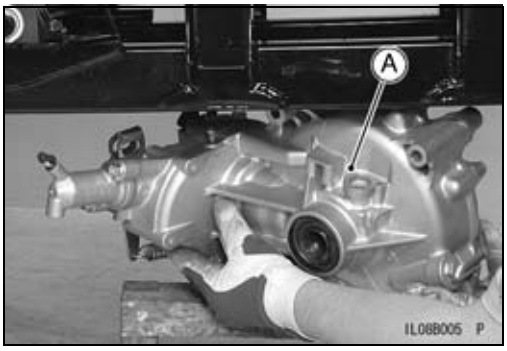
- Remove:
  Rear Final Gear Case Bracket Bolts [A]
  Rear Final Gear Case Brackets [B]



- Support the rear final gear case with a suitable jack and/or stand [A].
- Remove:
  Rear Final Gear Case Bolts [B] and Nuts



- Remove:
  Rear Final Gear Case [A]



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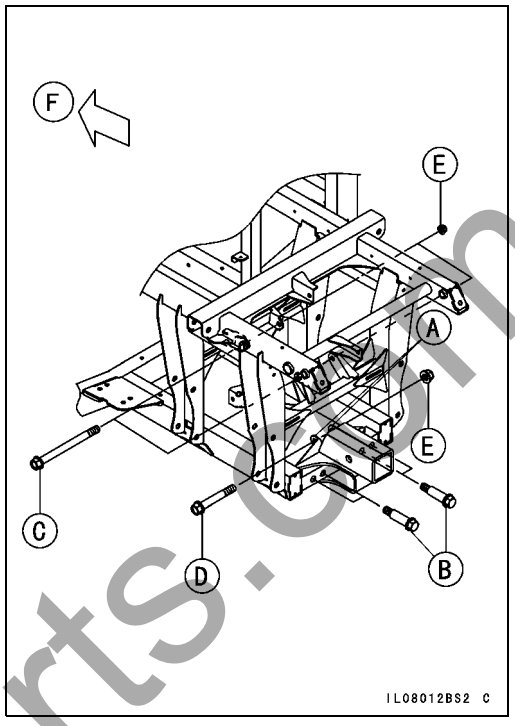
Rear Final Gear Case

Rear Final Gear Case Installation

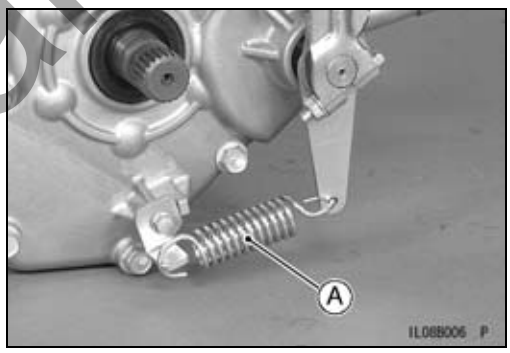


- Install:
  Rear Final Gear Case
  Bracket [A]
  Bracket Bolts [B]
- Apply a non-permanent locking agent to the rear final gear case bolts.
- Install:
  Rear Final Gear Case Bolts [C], L=120 mm (4.72 in.)
  Rear Final Gear Case Bolts [D], L=70 mm (2.76 in.)
- Tighten:

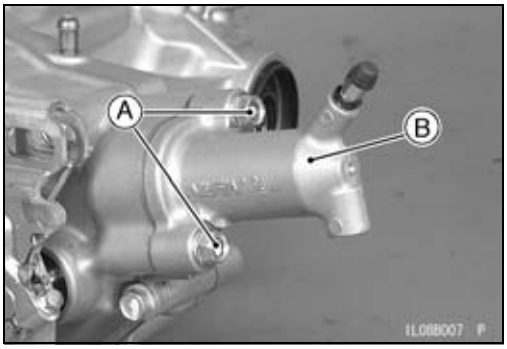
Torque - Rear Final Gear Case Bracket Bolts: 90.5 N·m (9.2 kgf·m, 67 ft·lb)
Rear Final Gear Case Mounting Nuts [E]: 90.5 N·m (9.2 kgf·m, 67 ft·lb)

  [F] Front
- Install:
  Removed Parts (see applicable chapters)

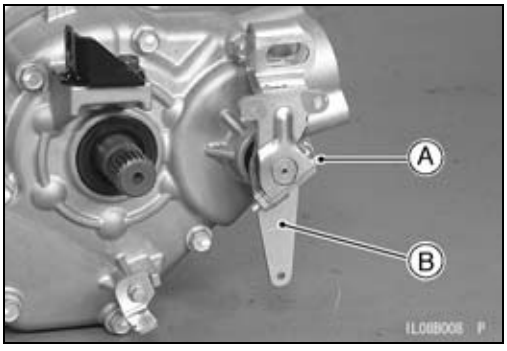
Rear Final Gear Case Disassembly



- Remove:
  Rear Final Gear Case (see Rear Final Gear Case Removal)
  Spring [A]



- Remove:
  Master Cylinder Mounting Bolts [A]
  Master Cylinder [B]



- Remove:
  Bolt [A] and Nut
  Brake Cam Lever [B]

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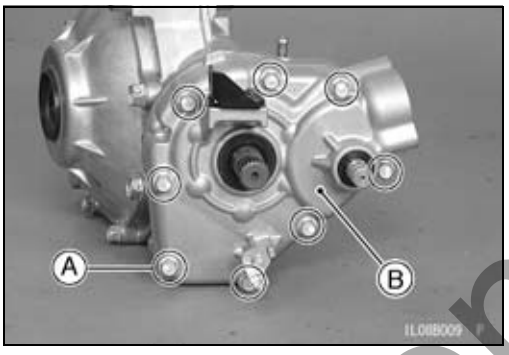
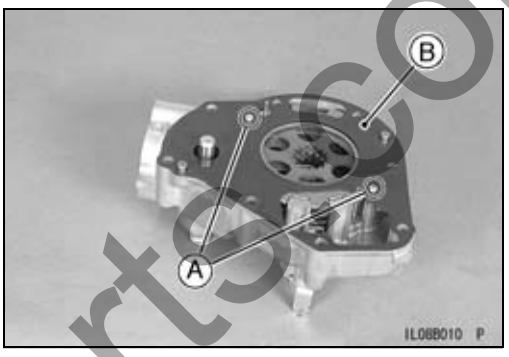
Rear Final Gear Case

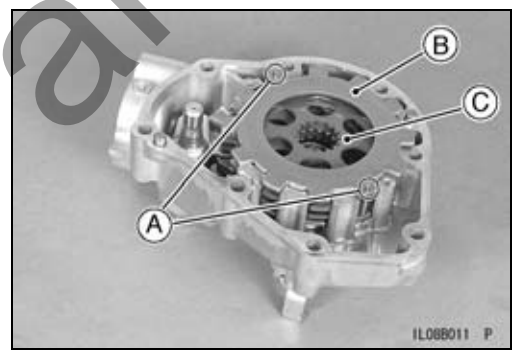
- Remove:
  Rear Final Gear Case Front Cover Bolts [A]
  Rear Final Gear Case Front Cover [B]



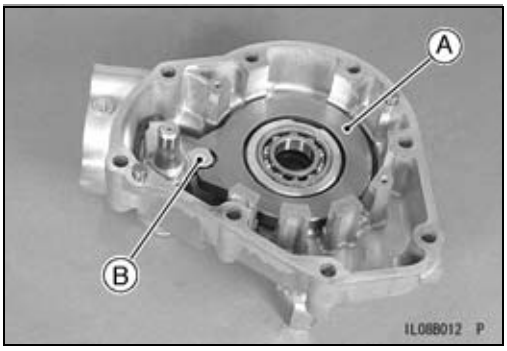
- Remove:
  Gasket Screws [A]
  Gasket [B]



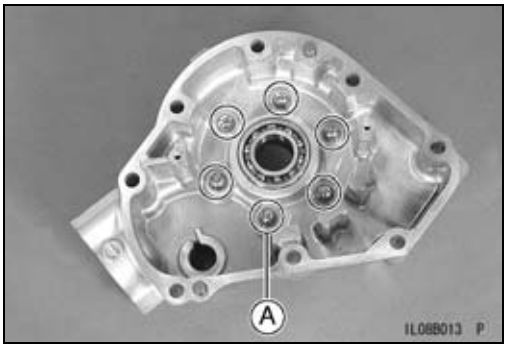
- Remove:
  Set Pins [A], Steel Plates [B] and Friction Plates [C]



- Remove:
  Brake Cam Plate [A]
  Brake Camshaft [B]



- Remove:
  Steel Balls [A]



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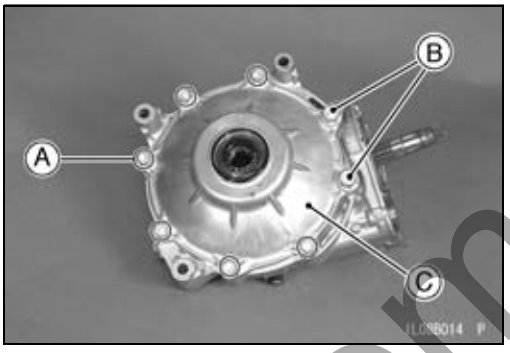
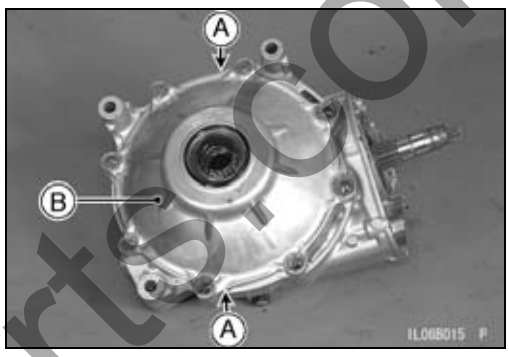
Rear Final Gear Case

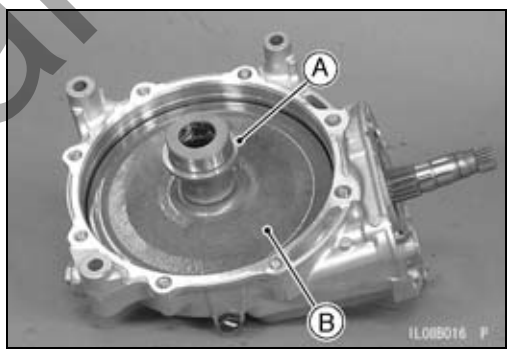
● Remove:
Rear Final Gear Case Right Cover Bolts (M10) [A]
Rear Final Gear Case Right Cover Bolts (M12) [B]
Rear Final Gear Case Right Cover [C]



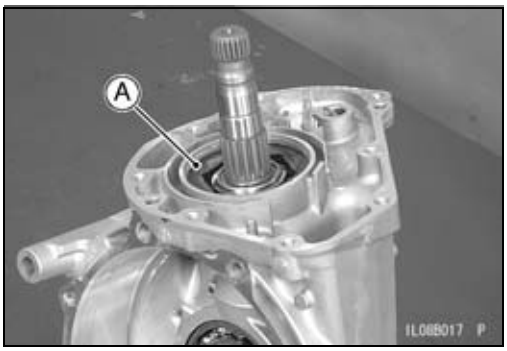
● Using the pry points [A], remove the rear final gear case right cover [B].



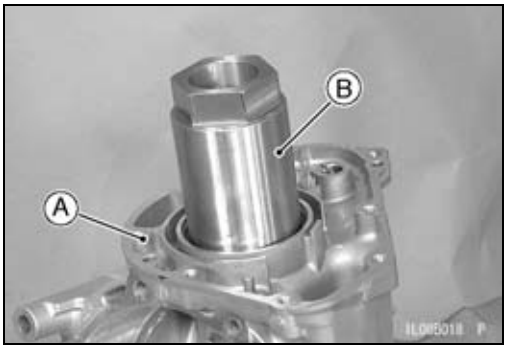
● Remove:
Shims [A] (both sides)
Ring Gear [B]



● Remove:
Pinion Gear Bearing Holder [A]



○Hold the rear final gear case [A] in a vise, and remove the bearing holder using the socket wrench [B].
Special Tool - Socket Wrench, Hex 50: 57001-1478
○If it is difficult to break free the holder, apply the heat to it to softer the locking agent.



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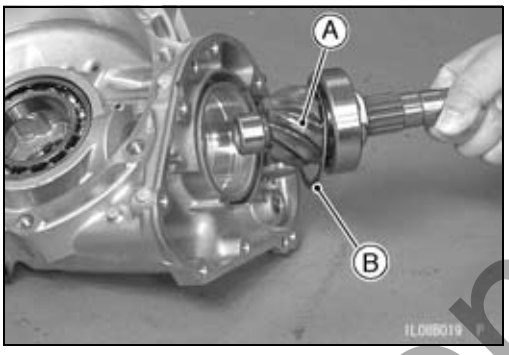
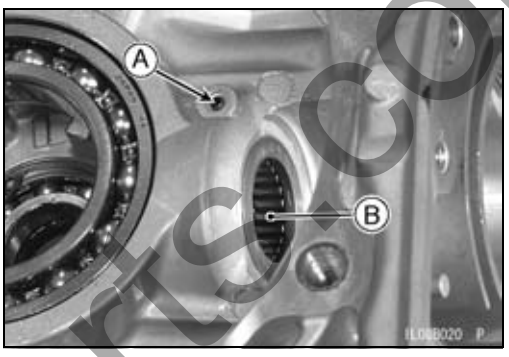
Rear Final Gear Case

- Remove:
  Pinion Gear Unit [A]
  Shim(s) [B]



- Drill out the spring pin [A] with a drill bit of the 3 mm (0.12 in) diameter and remove it.
- Remove the needle bearing [B].

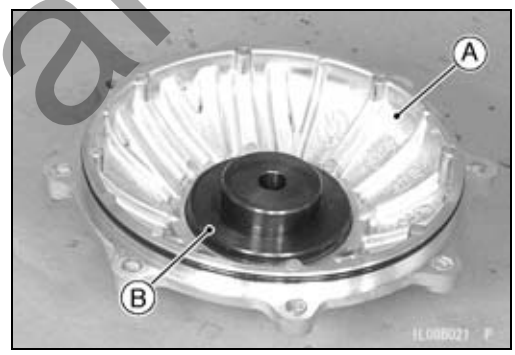


Rear Final Gear Case Right Cover Assembly

[A] Rear Final Gear Case Right Cover

- Press:
  Ball Bearing (until bottomed)

Special Tool - Bearing Driver, ϕ54.3 [B]: 57001-1488

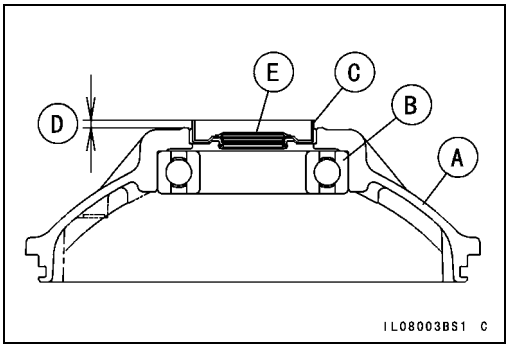


[A] Rear Final Gear Case Right Cover
[B] Ball Bearing

- Press the oil seal [C] so that the projecting distance is 3.5 mm (0.14 in.) [D] as shown in the figure.

Special Tool - Bearing Driver Set: 57001-1129

- Apply Grease:
  Oil Seal Lips [E]



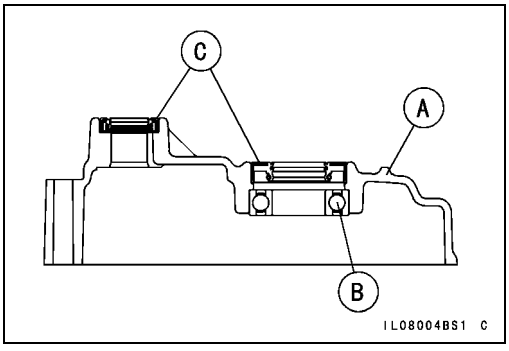
Rear Final Gear Case Front Cover Assembly

[A] Rear Final Gear Case Front Cover

- Press:
  Ball Bearing [B] (until bottomed)

Special Tool - Bearing Driver Set: 57001-1129

- Press the faces of the oil seals [C] are flush with the ends of the housing.
- Apply Grease:
  Oil Seal Lips



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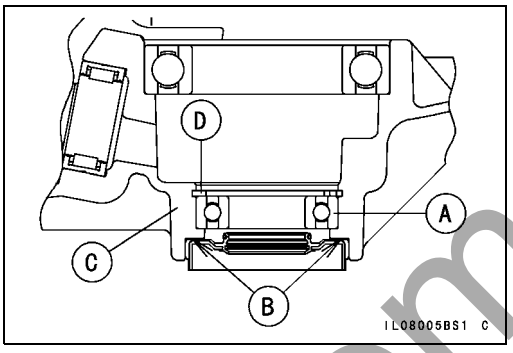
Rear Final Gear Case

Rear Final Gear Case Assembly



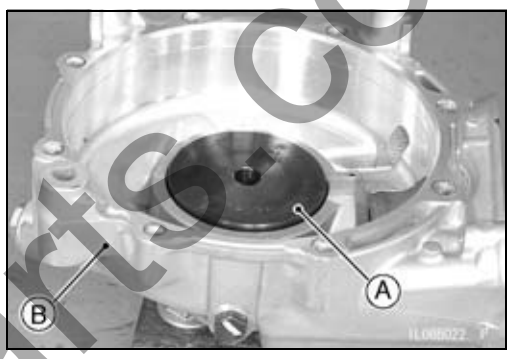
- Apply specified oil to the bearings.
- Press:
  Ball Bearing [A] (until bottomed)

  Special Tool - Bearing Driver Set: 57001-1129

○When pressing the bearing, support the face [B] of the rear final gear case [C] with a suitable block or press the bearing with less than 5 ton.

- Install:
  New Circlip [D]

  Special Tool - Inside Circlip Pliers: 57001-143

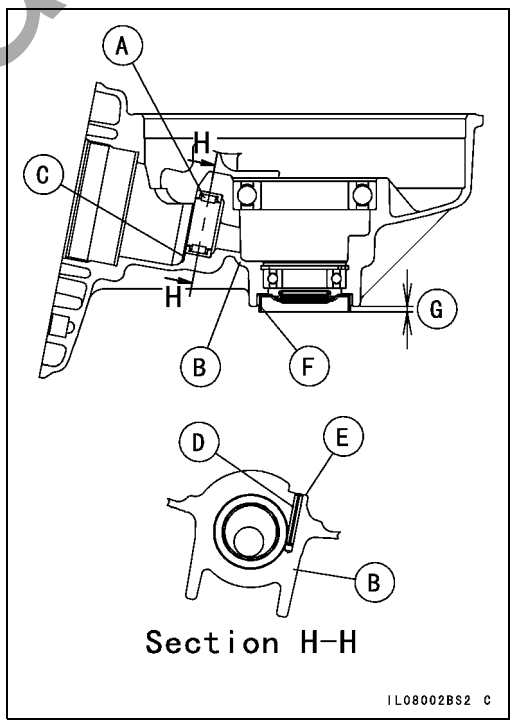


- Press:
  Ball Bearing (until bottomed)

  Special Tool - Baring Driver, ϕ54.3 [A]: 57001-1488

  [B] Rear Final Gear Case

- Press the needle bearing [A] in the rear final gear case [B] so that the surface is flush with the case end [C].
- Press the pin [D] in the rear final gear case so that the surface is flush with the case end [E].
- Press the oil seal [F] so that the projecting distance is 3.5 mm (0.14 in.) [G] as shown in the figure.
- Apply grease:
  Oil Seal Lip



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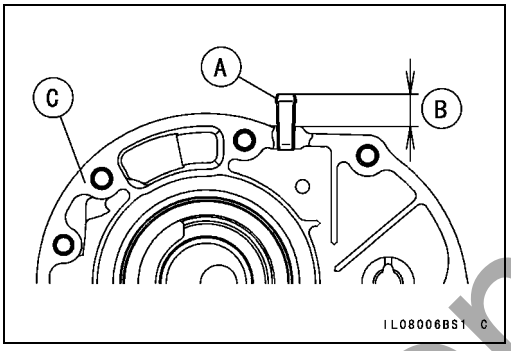
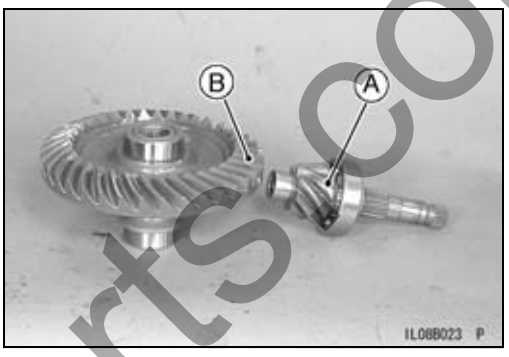
Rear Final Gear Case

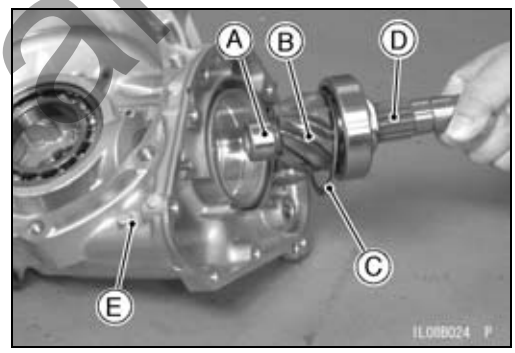
- Press the fitting [A] so that the projecting distance is 14 mm (0.55 in.) [B] as shown in the figure.
  [C] Rear Final Gear Case



- Visually check the pinion gear [A] and ring gear [B] for scoring, chipping, or other damage.
- ★Replace the bevel gear as a set if either gear is damaged since they are lapped as a set in the factory to get the best tooth contact.
- Be sure to check and adjust the bevel gear backlash and tooth contact when any of the backlash-related parts are replaced (see Rear Final Bevel Gear Adjustment).

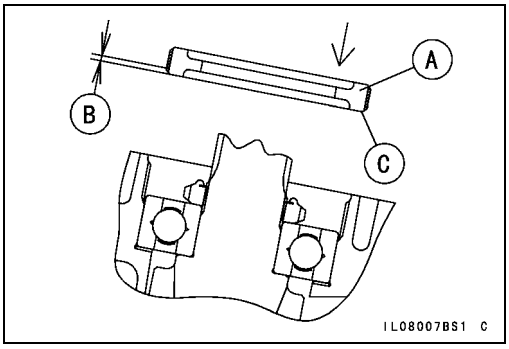


- Apply specified oil to the journal [A] and teeth [B].
- Insert the shim [C] and pinion gear unit [D] in the rear final gear case [E].

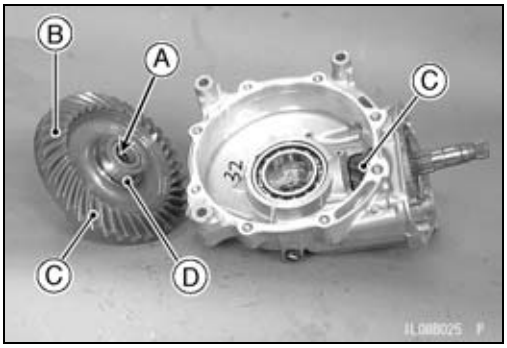


- Apply a non-permanent locking agent to the pinion gear bearing holder [A], but do not apply a non-permanent locking agent to one pitch [B] from the tip.
- Install the pinion gear bearing holder so that the no coating side [C] faces the bearing.
- Tighten:

Torque - Pinion Gear Bearing Holder: 450 N·m (45.9 kgf·m, 332 ft·lb)



- Apply molybdenum disulfide grease to the spline [A] in the ring gear [B].
- Apply specified oil to the journal and teeth [C].
- Install:
  Shim [D]
  Ring Gear



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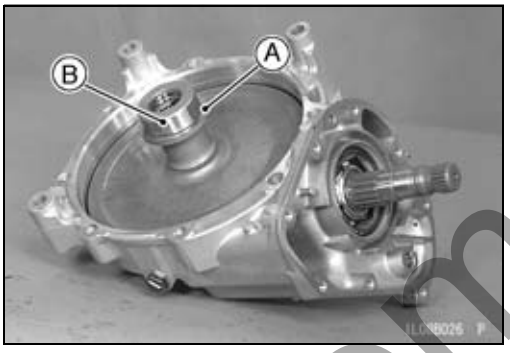
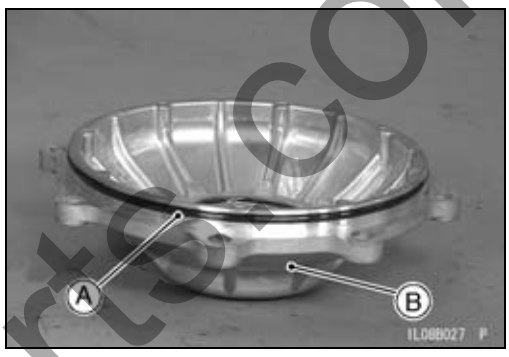
Rear Final Gear Case

- Install:
  Shim [A]
- Apply specified oil to the journal [B].

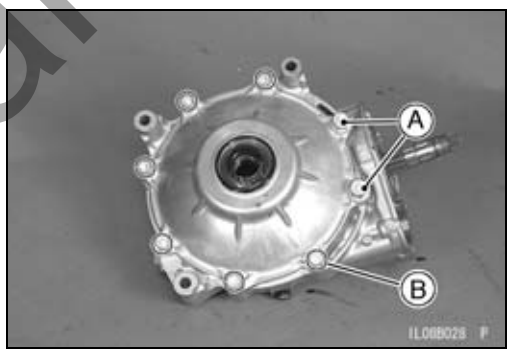


- Apply grease to the O-ring [A] and install the rear final gear case right cover [B].



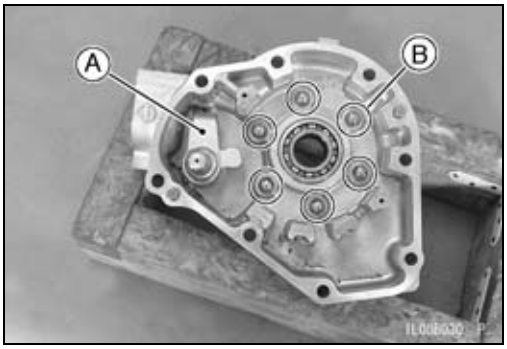
- Apply a non-permanent locking agent to the rear final gear case right cover bolts.
- Tighten:

Torque - Rear Final Gear Case Right Cover Bolts (M12) [A]:
94 N·m (9.6 kgf·m, 69 ft·lb)
Rear Final Gear Case Right Cover Bolts (M10) [B]:
49 N·m (5.0 kgf·m, 36 ft·lb)



- Apply specified oil to the journal [A] of the brake camshaft.

- Install:
  Brake Camshaft [A]
  Steel Balls [B]



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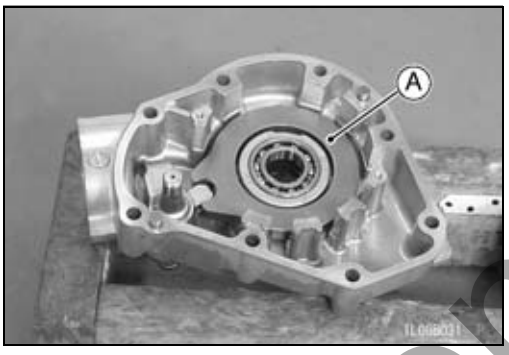
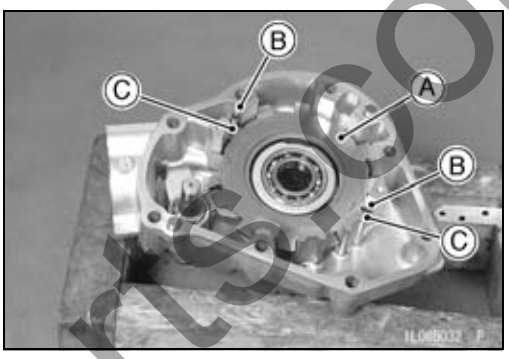
Rear Final Gear Case

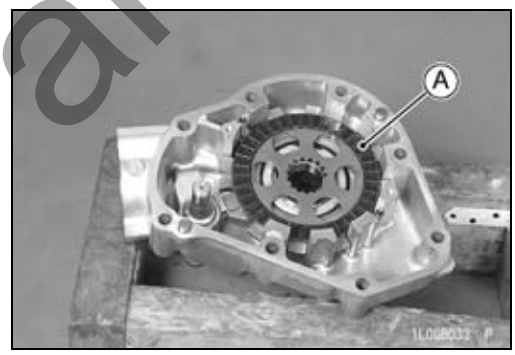
● Install the brake cam plate [A] so that the recess side faces to steel balls.



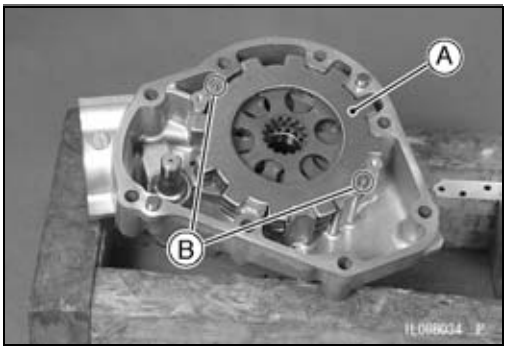
● Install:
Steel Plate [A] (P/No. 41080-1483, two holes) (as shown in the gigure)
Set Pins [B] and Springs [C]



● Install (alternately):
Friction Plates [A]
Steel Plates (P/No. 41080-1484, without hole)

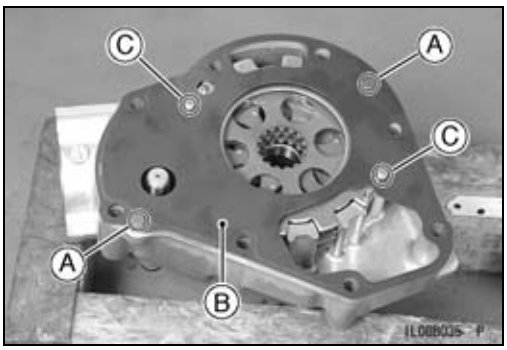


● Install:
Steel Plate [A] (P/No. 41080-1483, two holes)
○Insert the pins [B] into the holes of the steel plate.



● Install:
Dowel Pins [A]
New Gasket [B]
● Tighten:

Torque - Rear Final Gear Case Gasket Screws [C]: 1.3 N·m (0.13 kgf·m, 12 in·lb)



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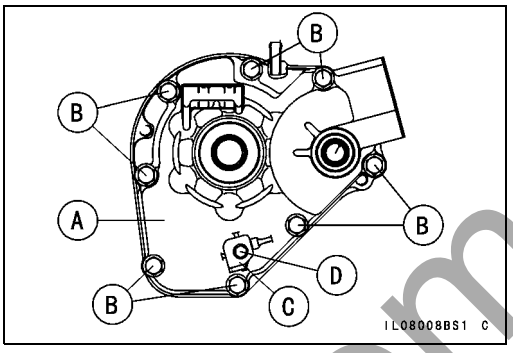
Rear Final Gear Case

● Install:
Rear Final Gear Case Front Cover [A]
● Tighten:

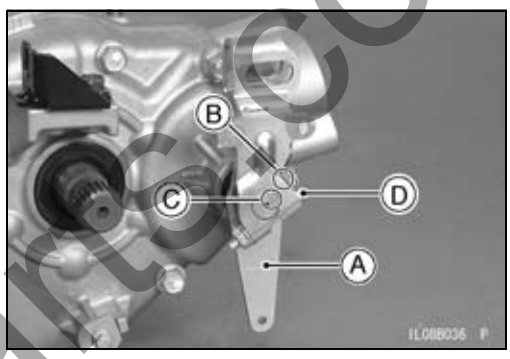
Torque - Rear Final Gear Case Front Cover Bolts [B]: 24 N·m (2.4 kgf·m, 18 ft·lb)

● Install:
Spring Bracket [C]
● Apply a non-permanent locking agent to the spring bracket bolt [D].
● Tighten:

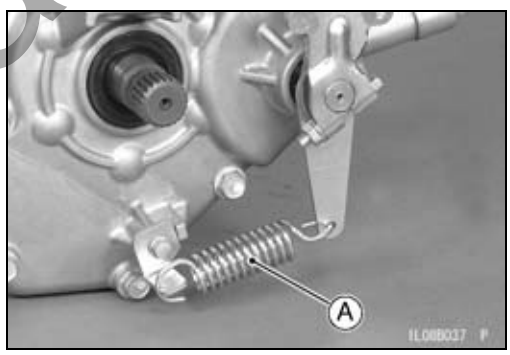
Torque - Spring Bracket Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



● Install:
Brake Cam Lever [A]
○Align the punch mark [B] of the brake cam lever with the punch mark [C] of the brake camshaft.
● Install:
Bolt [D] and Nut



● Install:
Spring [A]



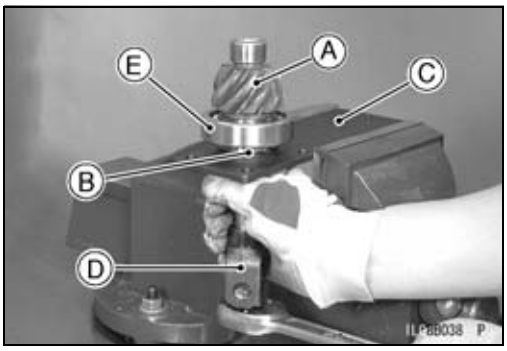
Pinion Gear Unit Disassembly

● Remove:
Pinion Gear Unit [A] (see Rear Final Gear Case Disassembly)
● Hold the pinion gear bearing holder nut [B] with the socket wrench [C] in a vise, and loosen the pinion gear shaft using the pinion gear holder [D].

Special Tools - Socket Wrench: 57001-1363
Pinion Gear Holder, m1.0: 57001-1281

● Remove the ball bearing [E] as necessary.

Special Tool - Bearing Puller: 57001-135



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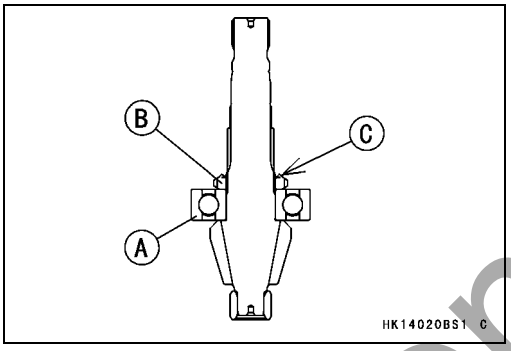
Rear Final Gear Case

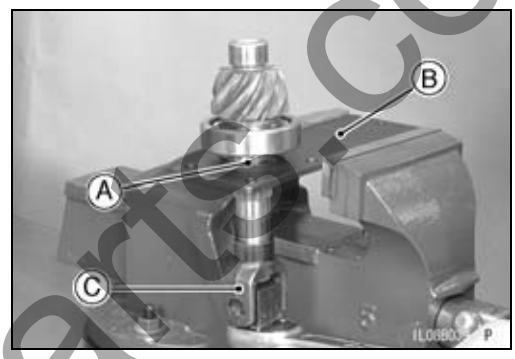
Pinion Gear Unit Assembly



- Visually inspect the bearing for abrasion, color change, or other damage.

★If there is any doubt as to the condition of a bearing, replace the bearing.

- Be sure to check and adjust the bevel gear backlash and tooth contact, when any of the backlash-related parts are replaced (see Rear Final Bevel Gear Adjustment).
- Press the bearing [A] on the pinion gear until it is bottomed.
- Install the pinion gear bearing holder nut [B] so that the projection [C] faces outward.



- Apply a non-permanent locking agent (Three Bond: TB2471 Blue) to the pinion gear bearing holder nut [A], and tighten it.

Special Tools - Socket Wrench [B]: 57001-1363
Pinion Gear Holder, m1.0 [C]: 57001-1281

Torque - Pinion Gear Bearing Holder Nut: 200 N·m (20.4 kgf·m, 148 ft·lb)

Rear Final Bevel Gear Adjustment

○The **backlash** and **tooth contact pattern** of the bevel gears must be correct to prevent the gears from making noise and being damaged.

- After replacing any of the backlash-related parts, be sure to check and adjust the backlash and tooth contact of the bevel gears. First, adjust backlash, and then tooth contact by replacing shims.

○The amount of backlash is influenced by the ring gear position more than by the pinion gear position.

○Tooth contact locations is influenced by the pinion gear position more than by the ring gear position.

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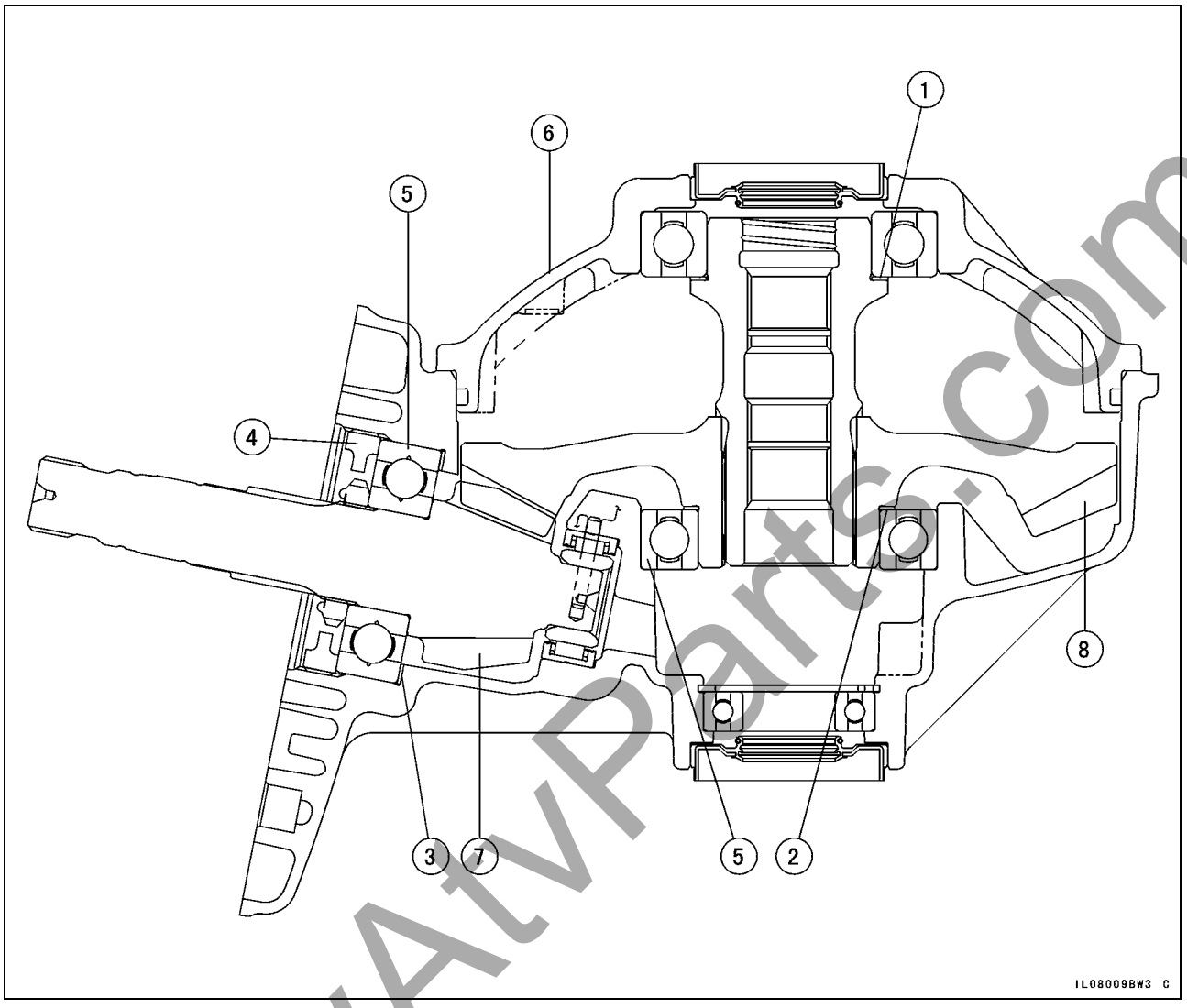
Rear Final Gear Case

Rear Final Gear Case (Backlash-related Parts)



1. Ring Gear Shim(s)
2. Ring Gear Shim(s)
3. Pinion Gear Shim(s)
4. Pinion Gear Bearing Holder
5. Ball Bearings
6. Gear Case Right Cover
7. Pinion Gear
8. Ring Gear

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Rear Final Gear Case

1. Ring Gear Shims for Backlash Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-0248
0.2 mm (0.008 in.)	92180-0247
0.5 mm (0.020 in.)	92180-0246
0.8 mm (0.031 in.)	92180-0245
1.0 mm (0.039 in.)	92180-0244
1.2 mm (0.047 in.)	92180-0243

2. Ring Gear Shims for Backlash Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1417
0.2 mm (0.008 in.)	92180-1418
0.5 mm (0.020 in.)	92180-1419
0.8 mm (0.031 in.)	92180-1420
1.0 mm (0.039 in.)	92180-1421
1.2 mm (0.047 in.)	92180-1422

3. Pinion Gear Shims for Tooth Contact Adjustment

Thickness	Part Number
0.15 mm (0.006 in.)	92180-1423
0.2 mm (0.008 in.)	92180-1424
0.5 mm (0.020 in.)	92180-1425
0.8 mm (0.031 in.)	92180-1426
1.0 mm (0.039 in.)	92180-1427
1.2 mm (0.047 in.)	92180-1428

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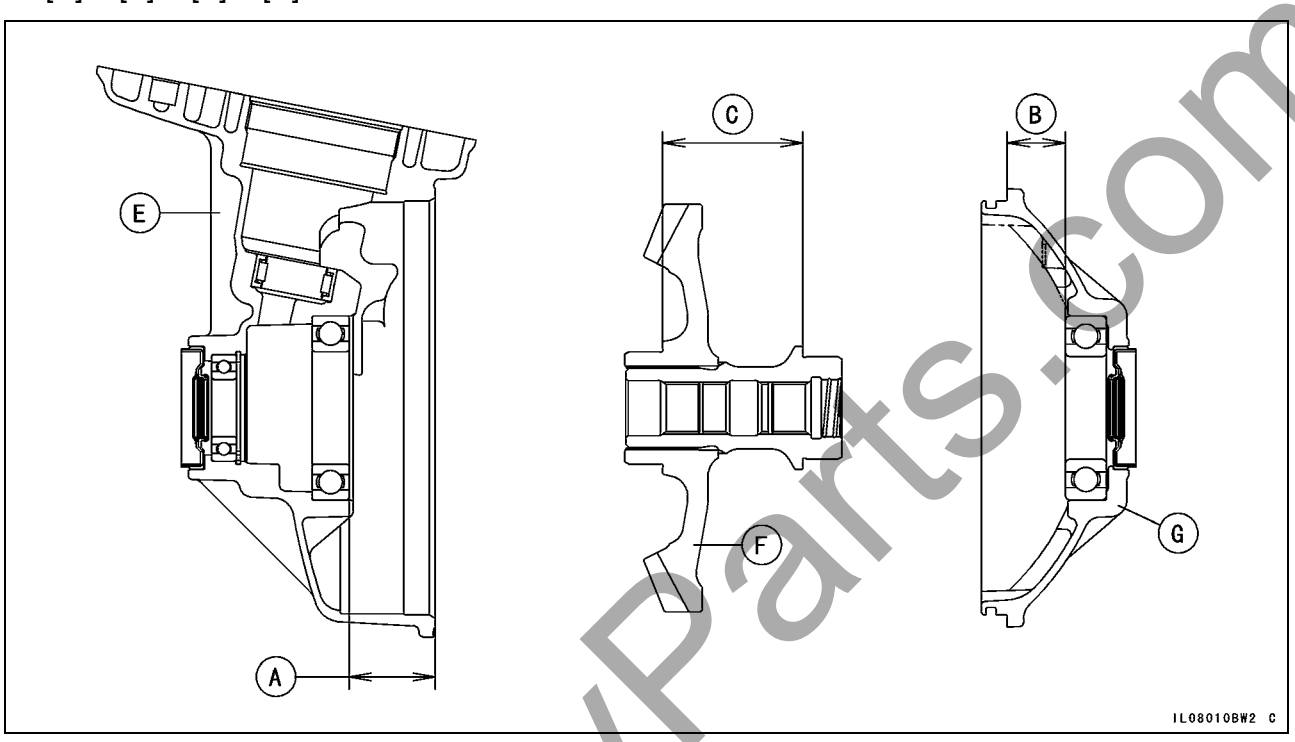
Rear Final Gear Case

Rear Final Gear Case Backlash Adjustment

- Clean dirt and oil off bevel gear teeth.
- Measure length [A], [B] and [C], and calculate the clearance [D] between the ring gear assembly and gear case covers.

  [D] = [A] + [B] – [C]



[E] Rear Final Gear Case
[F] Ring Gear Assembly
[G] Rear Final Gear Case Right Cover

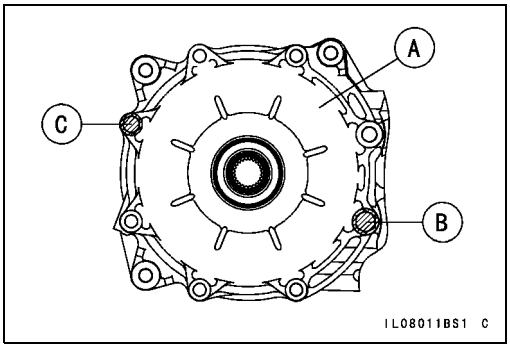
- Assemble the rear final gear case (see Rear Final Gear Case Assembly).

○When installing the pinion gear bearing holder, a non-permanent locking agent is not used.

○Use the following two spare bolts when installing the rear final gear case right cover [A].

M12 Bolt [B] L = 35 mm (1.38 in.), P = 1.25 mm (0.049 in.)

M10 Bolt [C] L = 35 mm (1.38 in.), P = 1.25 mm (0.049 in.)



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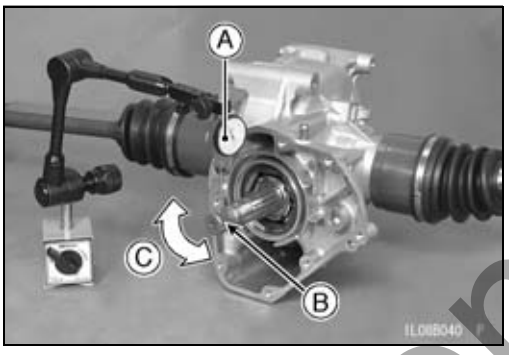
Rear Final Gear Case



- Temporarily install the rear axles in the gear case and hold them.
- Mount a dial gauge [A] so that the tip of the gauge is against the splined portion [B] of the pinion gear shaft.
- To measure backlash, turn the pinion gear shaft right and left [C] while holding the rear axles steady. The difference between the highest and lowest gauge reading is the amount of backlash.

○Measure backlash at three locations (equally spaced on the splines).

Rear Final Bevel Gear Backlash

Standard: 0.05 ~ 0.11 mm (0.002 ~ 0.004 in.)
(at pinion gear spline)

★If the backlash is not within the standard, replace the ring gear shims according to the below NOTE. To increase backlash, decrease the thickness of the shim(s) [1] and increase the thickness of the shim(s) [2]. To decrease backlash, increase the thickness of the shim(s) [1] and decrease the thickness of the shim(s) [2].

NOTE

○*The total of the ring gear shims, [1] and [2], should be less than [D] (the clearance between the ring gear assembly and gear case covers).*

○*Example:*

D = 2.34 mm →[1] + [2] = 2.30 mm

D = 2.26 mm →[1] + [2] = 2.25 mm

○The second decimal of the total of [1] and [2] should be .×0 or .×5 nearest of D.

- Recheck the backlash, and readjust if necessary.

Tooth Contact Adjustment

- Clean any dirt and oil off the bevel gear teeth.
- Apply checking compound to 4 or 5 teeth of the pinion gear.

NOTE

○*Apply checking compound to the teeth in a thin, even coat with a fairly stiff paint brush. If painted too thickly, the exact tooth pattern may not appear.*

○*The checking compound must be smooth and firm, with the consistency of tooth paste.*

○*Special compounds are available at automotive supply stores for the purpose of checking gear tooth patterns and contact. Use one of these for checking the bevel gears.*

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Rear Final Gear Case

- Assemble the rear final gear case (see Rear Final Gear Case Assembly).
- Turn the pinion gear for one revolution in the drive and reverse (coast) direction, while creating drag on the ring gear.
- Remove the ring gear and pinion gear unit to check the drive pattern and coast pattern of the bevel gear teeth.

○The tooth contact patterns of both (drive and coast) sides should be centrally located between the top and bottom of the tooth. The drive pattern can be a little closer to the toe and the coast pattern can be a somewhat longer and closer to the toe.

★If the tooth contact pattern is incorrect, replace the pinion gear shim(s), following the examples shown (see Front Final Gear Case Tooth Contact Adjustment).

- Then erase the tooth contact patterns, and check them again. Also check the backlash every time the shim(s) are replaced. Repeat the shim change procedure as necessary.

NOTE

○*If the backlash is out of the standard range after changing the pinion gear shim(s), change the ring gear shim(s) to correct the backlash before checking the tooth contact pattern.*

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Bearing and Oil Seal

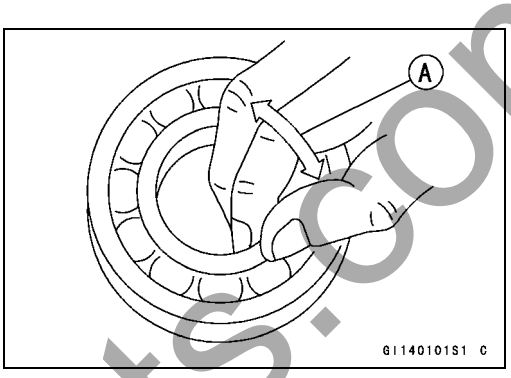
Ball or Needle Bearing Inspection

Since the bearings are made to extremely close tolerances, the clearance cannot normally be measured.

NOTICE
Do not remove any bearings for inspection except the right rear axle bearing.

- Turn each bearing in the case or hub back and forth [A] while checking for plays, roughness, or binding.

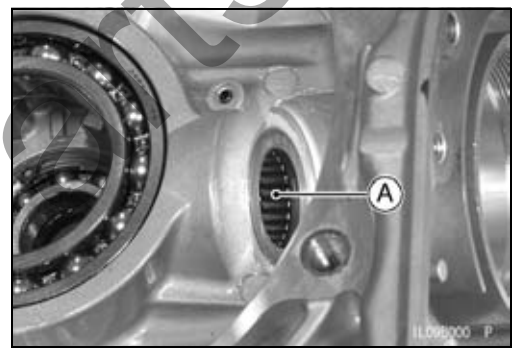
★If bearing play, roughness, or binding is found, replace the bearing.



- Check the needle bearings [A].

○The rollers in the needle bearing normally wear very little, and wear is difficult to measure. Instead of measuring, inspect the bearing for abrasion, color change, or other damage.

★If the bearing is damaged, replace the bearing.



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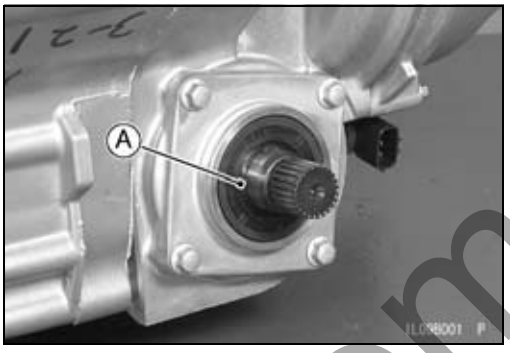
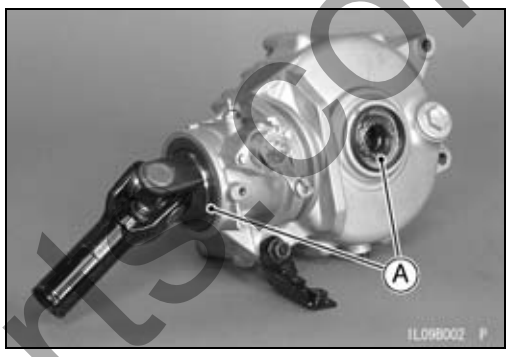
Bearing and Oil Seal

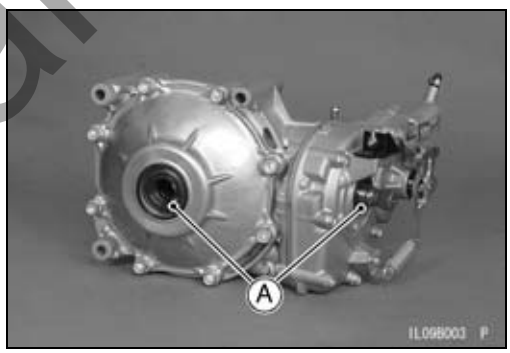
Oil Seal Inspection

- Inspect the oil seals [A].

★Replace any if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.







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Brakes

Table of Contents

Exploded View 12-2
Specifications 12-6
Brake Fluid 12-7
Front Brake Fluid Recommendation 12-7
Front Brake Fluid Level Inspection 12-7
Front Brake Fluid Change 12-7
Brake Line Air Bleeding 12-8
Brake Pedal and Master Cylinder 12-10
Brake Pedal Play Inspection 12-10
Brake Pedal Removal 12-10
Brake Pedal Installation 12-10
Front Master Cylinder Removal ... 12-11
Front Master Cylinder Installation 12-11
Front Master Cylinder Disassembly/Assembly 12-11
Front Master Cylinder Inspection . 12-12
Rear Master Cylinder Removal 12-12
Rear Master Cylinder Installation . 12-12
Rear Master Cylinder Disassembly/Assembly 12-12
Rear Master Cylinder Inspection .. 12-13
Calipers 12-14
Front Brake Caliper Removal 12-14
Front Brake Caliper Installation 12-14
Front Brake Caliper Disassembly 12-14
Front Brake Caliper Assembly 12-14
Caliper Piston Seal Damage Inspection 12-15
Dust Seal and Friction Boot Damage Inspection 12-15
Front Brake Caliper Piston and Cylinder Damage Inspection 12-15
Front Brake Caliper Holder Shaft Wear Inspection 12-15
Brake Pads 12-16
Front Brake Pad Removal 12-16
Front Brake Pad Installation 12-16
Front Brake Pad Wear Inspection 12-16
Brake Discs 12-17
Front Brake Disc Cleaning 12-17
Front Brake Disc Removal 12-17
Front Brake Disc Installation 12-17
Front Brake Disc Wear Inspection 12-17
Front Brake Disc Runout Inspection 12-17
Brake Hoses and Pipes 12-18
Brake Hose and Pipe Inspection .. 12-18
Brake Hose Replacement 12-18
Parking Brake Pedal and Cables 12-19
Parking Brake Pedal Inspection ... 12-19
Parking Brake Pedal Removal 12-19
Parking Brake Pedal Installation .. 12-19
Parking Brake Cable Removal 12-20
Parking Brake Cable Installation .. 12-20
Parking Brake Cable Lubrication . 12-20
Internal Wet Brake 12-21
Internal Wet Brake Disassembly .. 12-21
Internal Wet Brake Assembly 12-21

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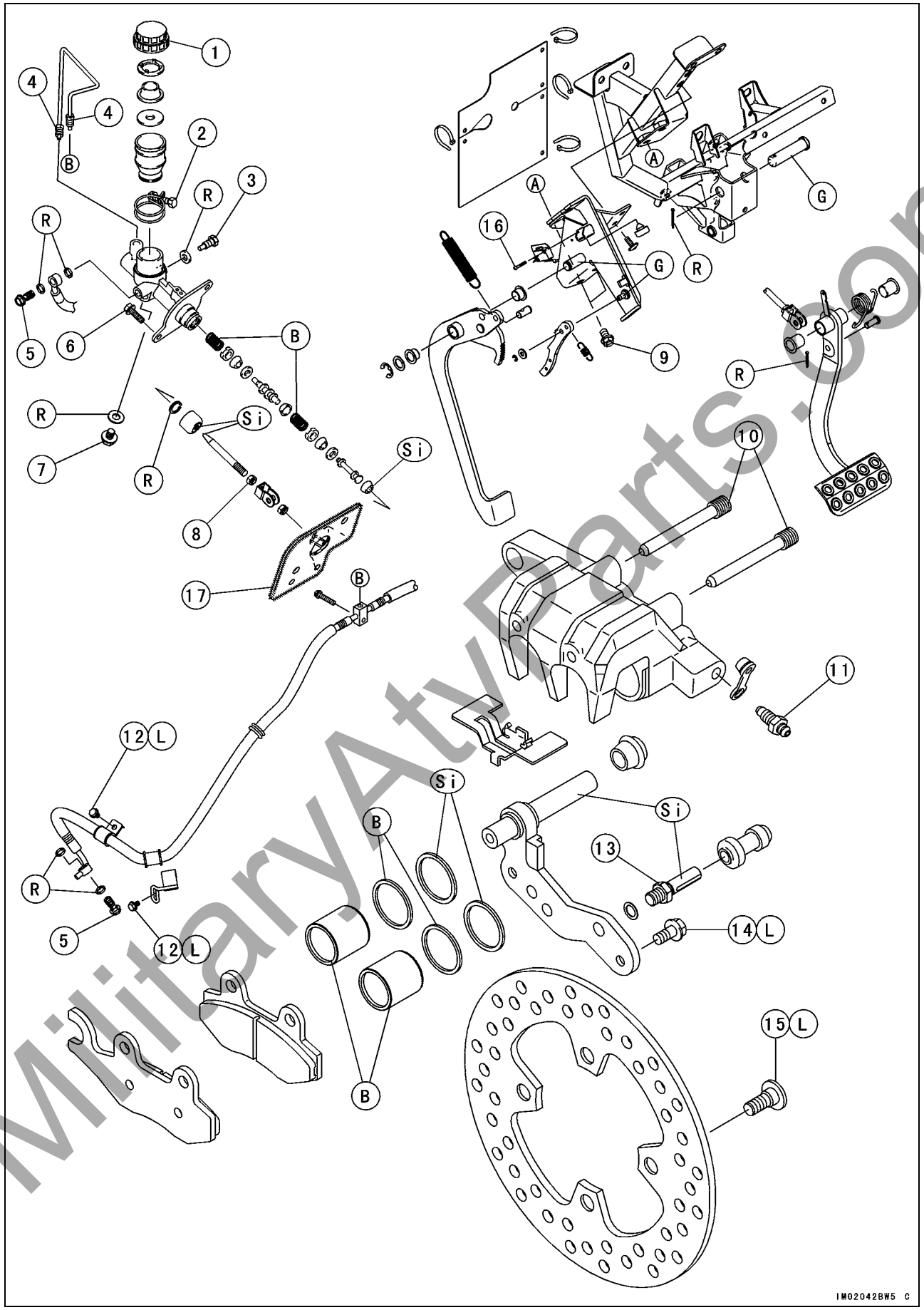
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Master Cylinder Reservoir Cap	3.4	0.35	30 in·lb	
2	Reservoir Clamp Bolt	6.2	0.63	55 in·lb	
3	Piston Stop Bolt	8.8	0.90	78 in·lb	
4	Brake Pipe Nipples	17.5	1.8	13	
5	Brake Hose Banjo Bolts	23.5	2.4	17	
6	Front Master Cylinder Mounting Bolts	23.5	2.4	17	
7	Master Cylinder Bolt	23.5	2.4	17	
8	Push Rod Locknut	17.2	1.8	13	
9	Parking Brake Pedal Assy Mounting Bolts	41.5	4.2	31	
10	Front Brake Pad Mounting Bolts	17.2	1.8	13	
11	Caliper Bleed Valves	7.8	0.80	69 in·lb	
12	Brake Hose Clamp Bolts	8.8	0.90	78 in·lb	L
13	Caliper Holder Shaft	17.2	1.8	13	
14	Brake Caliper Mounting Bolts	33	3.4	24	L
15	Front Brake Disc Mounting Bolts	41.5	4.2	31	L
16	Parking Brake Indicator Light Switch Screws	0.4	0.04	4 in·lb	

17. Apply sealing material to the hatched area.
B. Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
R: Replacement Parts
Si: Apply silicone grease.

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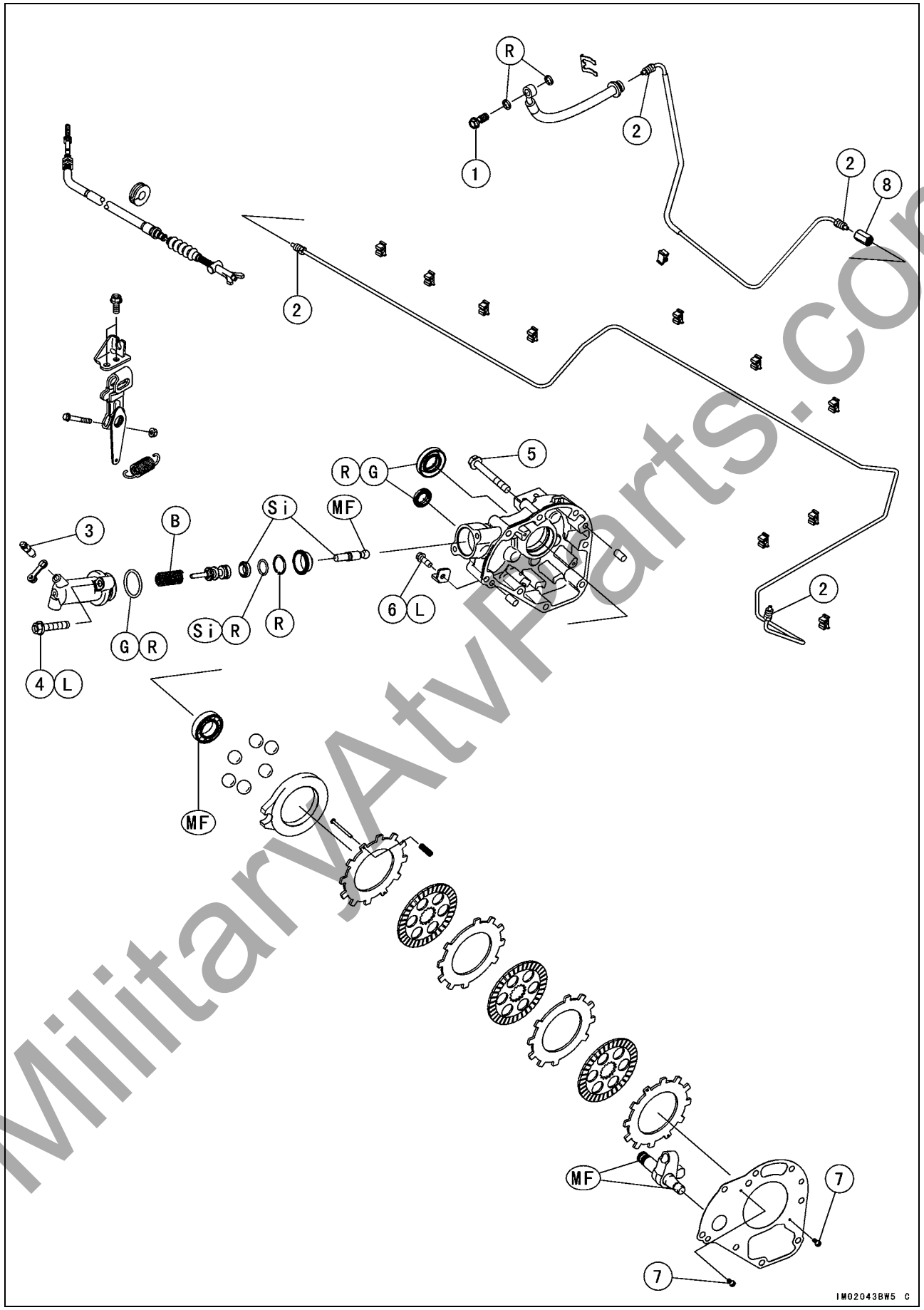
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Hose Banjo Bolts	23.5	2.4	17	
2	Brake Pipe Nipples	17.5	1.8	13	
3	Rear Master Cylinder Bleed Valve	7.8	0.80	69 in·lb	
4	Rear Master Cylinder Mounting Bolts	27	2.8	20	L
5	Rear Final Gear Case Front Cover Bolts	24	2.4	18	
6	Spring Bracket Bolt	8.8	0.90	78 in·lb	L
7	Rear Final Gear Case Gasket Screws	1.3	0.13	12 in·lb	
8	Brake Pipe Joint	17.5	1.8	13	

B: Apply brake fluid.
G: Apply grease.
L: Apply a non-permanent locking agent.
MF: Apply gear oil (MOBIL FLUID 424 or equivalent oil).
R: Replacement Parts
Si: Apply silicone grease.

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Specifications

Item	Standard	Service Limit
Brake Fluid		
Type	DOT3	– – –
Fluid Level	Between upper and lower level lines	– – –
Brake Pedal		
Brake Pedal Play	2 ~ 10 mm (0.08 ~ 0.39 in.)	– – –
Front Disc Brake		
Pad Lining Thickness	3.9 mm (0.15 in.)	1 mm (0.04 in.)
Disc Thickness	4.6 ~ 5.0 mm (0.18 ~ 0.20 in.)	4.3 mm (0.17 in.)
Disc Runout	TIR 0.25 mm (0.010 in.) or less	TIR 0.3 mm (0.012 in.)

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Brake Fluid

⚠ WARNING

When working with the disc brake, observe the precautions listed below.

1. Never reuse old brake fluid.
2. Do not use fluid from a container that has been left unsealed or that has been open for a long time.
3. Do not mix two types and brands of fluid for use in the brake. This lowers the brake fluid boiling point and could cause the brake to be ineffective. It may also cause the rubber brake parts to deteriorate.
4. Don't leave the reservoir cap off for any length of time to avoid moisture contamination of the fluid.
5. Don't add or change the fluid in the rain or when a strong wind is blowing.
6. Except for the disc pads and disc, use only disc brake fluid, isopropyl alcohol, or ethyl alcohol for cleaning brake parts. Do not use any other fluid for cleaning these parts. Gasoline, engine oil, or any other petroleum distillate will cause deterioration of the rubber parts. Oil spilled on any part will be difficult to wash off completely and will eventually deteriorate the rubber used in the disc brake.
7. When handling the disc pads or disc, be careful that no disc brake fluid or any oil gets on them. Clean off any fluid or oil that inadvertently gets on the pads or disc with a high-flash point solvent. Do not use one which will leave an oily residue. Replace the pads with new ones if they cannot be cleaned satisfactorily.
8. Brake fluid quickly ruins painted surfaces; any spilled fluid should be completely washed away immediately.
9. If any of the brake line fittings or the bleed valve is opened at any time, the **AIR MUST BE BLED FROM THE BRAKE LINE.**

Front Brake Fluid Recommendation

Use extra heavy-duty brake fluid only from a container marked DOT3.

Recommended Disc Brake Fluid
Type DOT 3

Front Brake Fluid Level Inspection

- Refer to the Brake Fluid Level Inspection in the Periodic Maintenance chapter.

Front Brake Fluid Change

- Refer to the Brake Fluid Change in the Periodic Maintenance chapter.

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Brake Fluid

Brake Line Air Bleeding

The brake fluid has a very low compression coefficient so that almost all the movement of the brake pedal is transmitted directly to the caliper for braking action. Air, however, is easily compressed. When air enters the brake lines, brake pedal movement will be partially used in compressing the air. This will make the lever or pedal feel spongy, and there will be a loss in braking power.

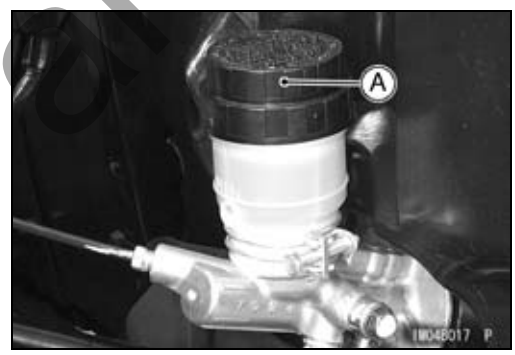
⚠ WARNING

Air in the brake lines diminish braking performance and can cause an accident resulting in injury or death. If the brake lever has a soft or "spongy" feeling mushy when it is applied, there might be air in the brake lines or the brake may be defective. Do not operate the vehicle and service the brake system immediately.

NOTE

○*The procedure to bleed the brake line is as follows.*

- Remove the reservoir cap [A] and fill the reservoir with new brake fluid.



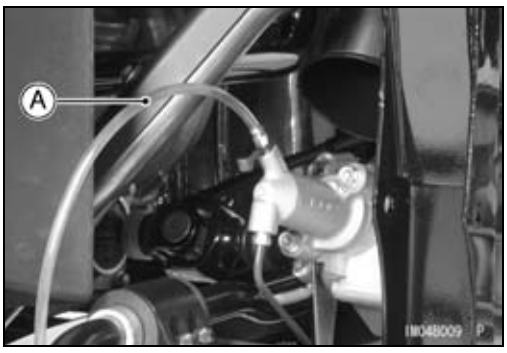
- Slowly pump the brake pedal several times until no air bubbles can be seen rising up through the fluid from the holes at the bottom of the reservoir.

○Bleed the air completely from the front master cylinder by this operation.

NOTE

○*Start with the rear master cylinder and finish with the front left or right caliper.*

- Remove the rubber cap from the bleed valve on the rear master cylinder.
- Connect a clear plastic hose [A] to the bleed valve on the rear master cylinder, and run the other end of the hose into a container.



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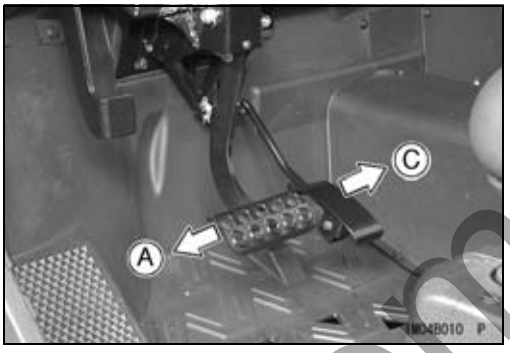
Brake Fluid



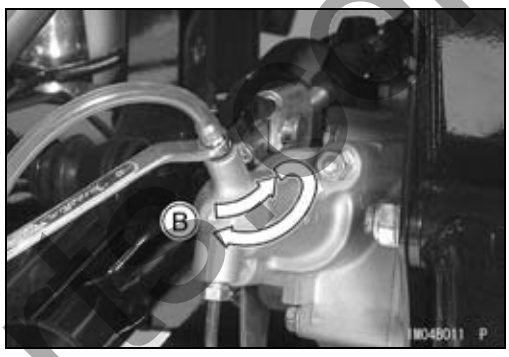
- Bleed the brake line and the rear master cylinder as follows:

○Repeat this operation until no more air can be seen coming out into the plastic hose.

1. Pump the brake pedal until it becomes hard, and apply the brake pedal and hold it [A].
2. Quickly open and close [B] the bleed valve while holding the brake pedal applied.
3. Release the brake pedal [C].

NOTE

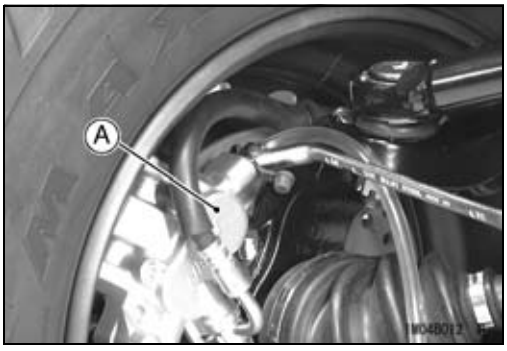
○*The fluid level must be checked several times during the bleeding operation and replenished as necessary. If the fluid in the reservoir runs completely out any time during bleeding, the bleeding operation must be done over again from the beginning since air will have entered the line.*



- Remove the clear plastic hose.
- Tighten:

Torque - Rear Master Cylinder Bleed Valve: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- Install the rubber cap.



- Repeat the previous step for front calipers [A].
- After the air bleeding, tighten the caliper bleed valves.

Torque - Caliper Bleed Valves: 7.8 N·m (0.80 kgf·m, 69 in·lb)

- When air bleeding is finished, add fluid up to the upper level in the reservoir.
- Tighten:

Torque - Front Master Cylinder Reservoir Cap: 3.4 N·m (0.35 kgf·m, 30 in·lb)

- Apply the brake forcefully for a few seconds, and check for fluid leakage around the fittings.

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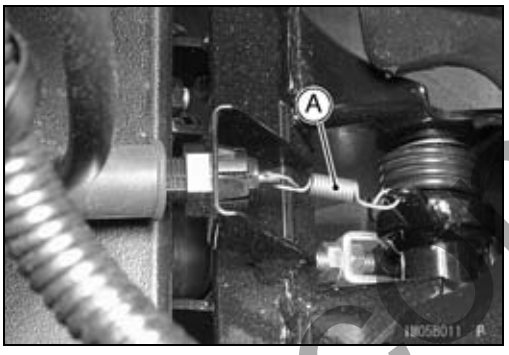
Brake Pedal and Master Cylinder

Brake Pedal Play Inspection

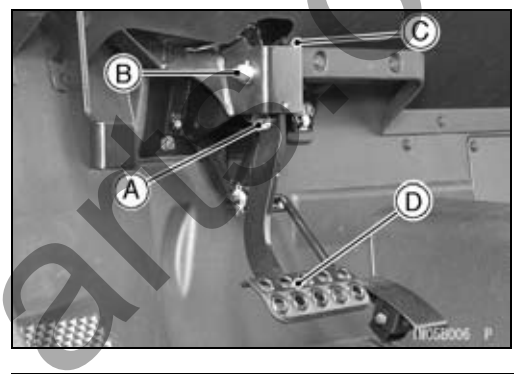
- Refer to the Brake Pedal Play Inspection in the Periodic Maintenance chapter.

Brake Pedal Removal

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Lift and hold the front fender rear (see Front Fender Rear Removal in the Frame chapter).
- Remove:
  Brake Light Switch Spring [A]

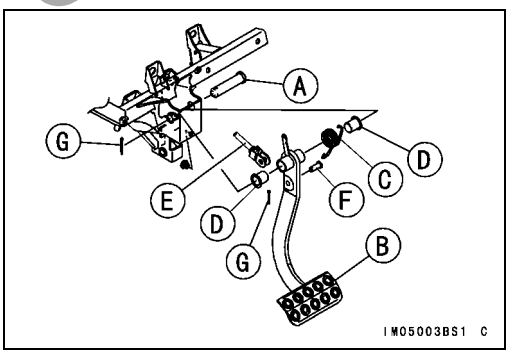


- Remove:
  Cotter Pin and Pin [A]
  Cotter Pin and Brake Shaft [B]
  Spring [C]
  Brake Pedal [D]

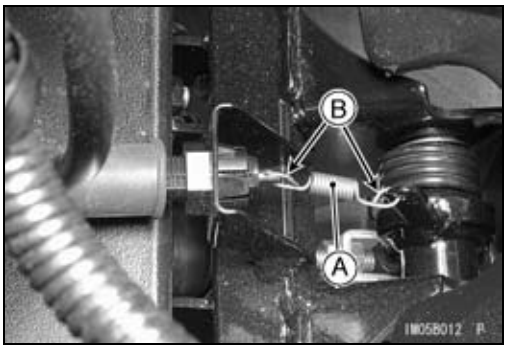


Brake Pedal Installation

- Apply grease to the brake shaft [A].
- Install:
  Brake Pedal [B]
  Spring [C]
  Bushings [D]
  Brake Shaft
  Push Rod [E] and Pin [F]
  New Cotter Pins [G]
- Bend the cotter pins over the shaft and pin ends.



- Install:
  Brake Light Switch Spring [A]
- After the spring is installed, bend the spring ends [B] to prevent it from coming off.
- Install:
  Front Fender Rear (see Front Fender Rear Installation in the Frame chapter)



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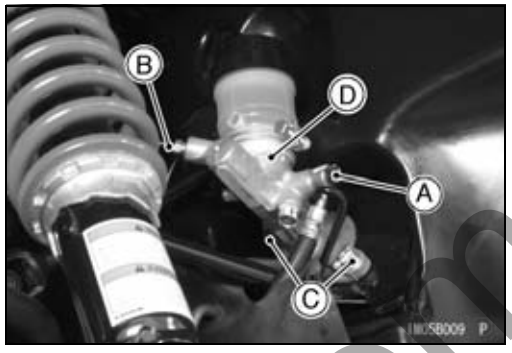
Brake Pedal and Master Cylinder

Front Master Cylinder Removal



- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove:
  Brake Hose Banjo Bolts [A]
  Brake Pipe Nipple [B] (unscrew)
- Immediately wipe up any brake fluid that spills.

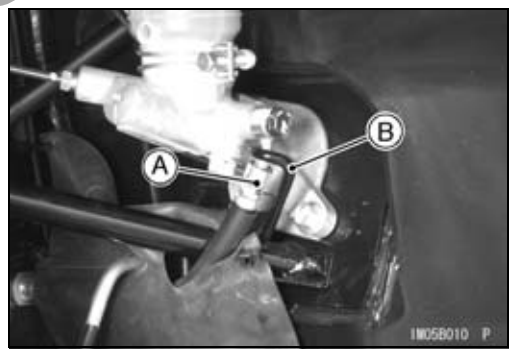
NOTICE
Brake fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.

- Remove:
  Front Master Cylinder Mounting Bolts [C]
  Front Master Cylinder [D]

Front Master Cylinder Installation

- Install:
  Front Master Cylinder
  Front Master Cylinder Mounting Bolts
- Tighten:

Torque - Front Master Cylinder Mounting Bolts: 23.5 N·m (2.4 kgf·m, 17 ft·lb)



- Replace the washers on each side of the hose fitting with new ones.

○Touch the brake hose clasp [A] to the stopper [B].

- Tighten:

Torque - Brake Hose Banjo Bolts: 23.5 N·m (2.4 kgf·m, 17 ft·lb)
Brake Pipe Nipple: 17.5 N·m (1.8 kgf·m, 13 ft·lb)

- Bleed the brake line after master cylinder installation.
- Adjust the brake pedal play (see Brake Pedal Play Inspection).
- Check that the brake line has proper fluid pressure and no fluid leakage.

Front Master Cylinder Disassembly/Assembly

- Refer to the Front Brake Master Cylinder Cup and Dust Seal Replacement in the Periodic Maintenance chapter.

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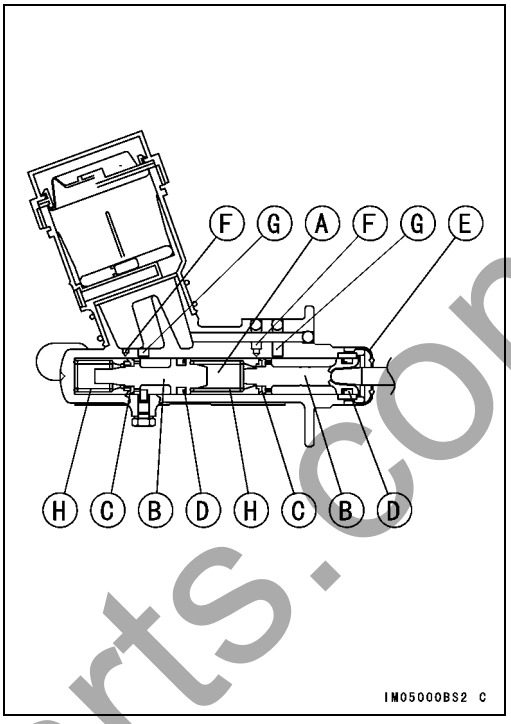
Brake Pedal and Master Cylinder

Front Master Cylinder Inspection



- Disassemble the front master cylinder (see Front Brake Master Cylinder Cup and Dust Seal Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inside of the cylinder [A] and on the outside of the pistons [B].

★If the cylinder or piston shows any damage, replace them.

- Inspect the primary cups [C] and secondary cups [D].

★If a cup is worn, damaged, softened (rotted), or swollen, replace it.

★If fluid leakage is noted at the brake push rod, the secondary cup of the rear piston should be replaced.

- Check the dust cover [E] for damage.

★If it is damaged, replace it.

- Check that the relief [F] and supply [G] ports are not plugged.

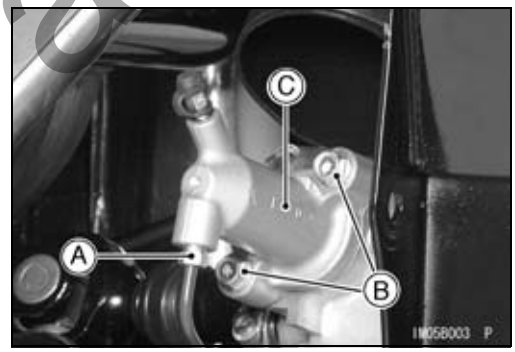
★If the small relief port becomes plugged, the brake shoes will drag on the drum. Blow the ports clean with compressed air.

- Check the piston return springs [H] for any damage.

★If the spring is damaged, replace it.

Rear Master Cylinder Removal

- Remove:
  Brake Pipe Nipple [A] (unscrew)
- Immediately wipe up any brake fluid that spills.

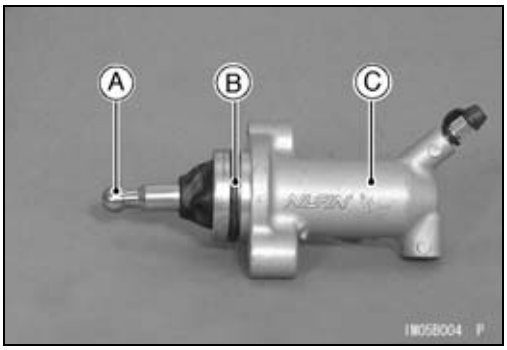


NOTICE

Brake fluid quickly ruins painted surface; any spilled fluid should be completely washed away immediately.

- Remove:
  Rear Master Cylinder Mounting Bolts [B]
  Rear Master Cylinder [C]

Rear Master Cylinder Installation



- Apply specified oil to the rod end [A].
- Apply grease to the O-ring [B].
- Install:
  Rear Master Cylinder [C]
- Apply a non-permanent locking agent to the rear master cylinder mounting bolts.
- Tighten:

Torque - Rear Master Cylinder Mounting Bolts: 27 N·m (2.8 kgf·m, 20 ft·lb)
Brake Pipe Nipple: 17.5 N·m (1.8 kgf·m, 13 ft·lb)

- Bleed the brake line after master cylinder installation.
- Check that the brake line has proper fluid pressure and no fluid leakage.

Rear Master Cylinder Disassembly/Assembly

- Refer to the Rear Brake Master Cylinder Cup, O-ring and Boot Replacement in the Periodic Maintenance chapter.

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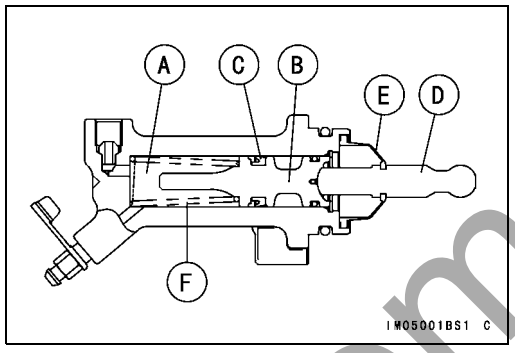
Brake Pedal and Master Cylinder

Rear Master Cylinder Inspection



- Disassemble the rear master cylinder (see Rear Brake Master Cylinder Cup, O-ring and Boot Replacement in the Periodic Maintenance chapter).
- Check that there are no scratches, rust or pitting on the inside of the cylinder [A] and on the outside of the pistons [B].

★If the cylinder or piston shows any damage, replace them.

- Inspect the cup [C].

★If a cup is worn, damaged, softened (rotted), or swollen, replace it.

★If fluid leakage is noted at the push rod [D], the cup of the piston should be replaced.

- Check the boot [E] for damage.

★If it is damaged, replace it.

- Check the piston return springs [F] for any damage.

★If the spring is damaged, replace it.

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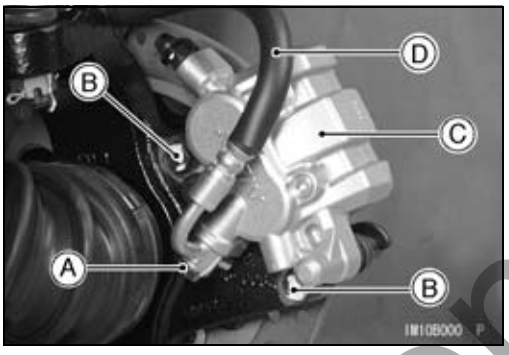
Calipers

Front Brake Caliper Removal



- Remove the front wheel (see Wheel Removal in the Wheels/Tires chapter).
- Loosen the banjo bolt [A] at the brake hose lower end, and tighten it loosely.
- Unscrew the caliper mounting bolts [B], and detach the caliper [C] from the disc.
- Unscrew the banjo bolt and remove the brake hose [D] from the caliper.

NOTICE

Immediately wash away any brake fluid that spills.

NOTE

○*If the caliper is to be disassembled after removal and if compressed air is not available, disassemble the caliper before the brake hose is removed (see Front Brake Caliper Piston Seal and Dust Seal Replacement).*

Front Brake Caliper Installation

- Install the caliper and brake hose lower end.

○Replace the washers that are on each side of hose fitting with new ones.

- Touch the stopper of the brake hose to the stopper on the caliper.
- Tighten:

Torque - Brake Caliper Mounting Bolts: 33 N·m (3.4 kgf·m, 25 ft·lb)
Brake Hose Banjo Bolt: 23.5 N·m (2.4 kgf·m, 17 ft·lb)

- Check the fluid level in the brake reservoir.
- Bleed the brake line (see Brake Line Air Bleeding).
- Check the brake for good braking power, no brake drag, and no fluid leakage.

⚠ WARNING

After servicing, it takes several applications of the brake pedal before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the vehicle until a firm brake pedal is obtained by pumping the pedal until the pads are against the disc.

Front Brake Caliper Disassembly

- Refer to the Front Brake Caliper Piston Seal and Dust Seal Replacement in the Periodic Maintenance chapter.

Front Brake Caliper Assembly

- Refer to the Front Brake Caliper Piston Seal and Dust Seal Replacement in the Periodic Maintenance chapter.

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Calipers

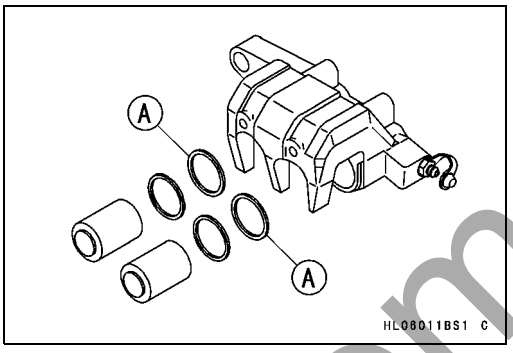
Caliper Piston Seal Damage Inspection

The piston seals [A] around the piston maintain the proper pad/disc clearance. If the seals are not satisfactory, pad wear will increase, and constant pad drag on the disc will raise brake and brake fluid temperature.

- Replace the piston seals in accordance with the Periodic Maintenance Chart or under any of the following conditions.

○Brake fluid leakage around the pad
○Brakes overheat
○There is a large difference in inner and outer pad wear.
○The seal is stuck to the pistons.

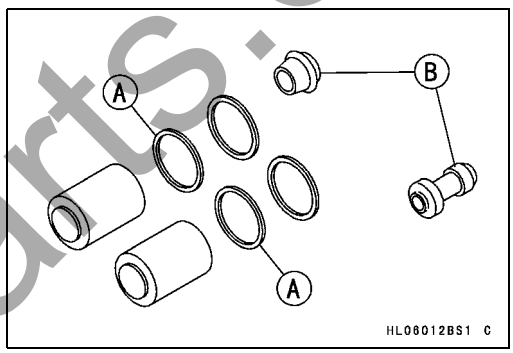
★If the piston seal is replaced, replace the dust seal as well. Also, replace all seals every other time the pads are changed.



Dust Seal and Friction Boot Damage Inspection

- Replace the dust seals [A] in accordance with the Periodic Maintenance Chart or check that the dust seals and friction boots [B] are not cracked, worn swollen, or otherwise damaged.

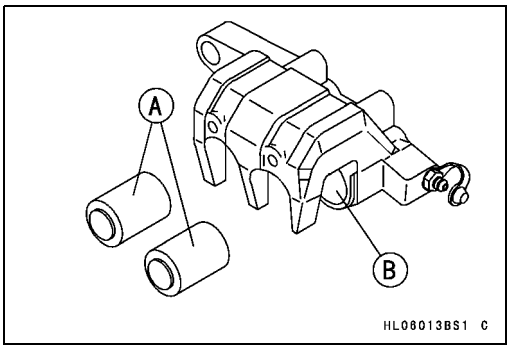
★If they show any damage, replace them.



Front Brake Caliper Piston and Cylinder Damage Inspection

- Visually inspect the piston [A] and cylinder surfaces [B].

★Replace the caliper if the cylinder and piston are badly scored or rusty.



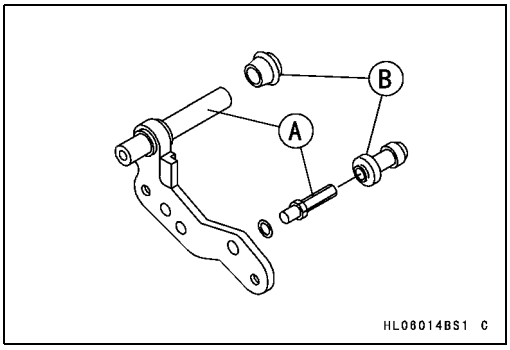
Front Brake Caliper Holder Shaft Wear Inspection

The caliper body must slide smoothly on the caliper holder shafts [A]. If the body does not slide smoothly, one pad will wear more than the other, pad wear will increase, and constant drag on the disc will raise brake and brake fluid temperature.

- Check to see that the caliper holder shafts are not badly worn or stepped, and that the rubber boots [B] are not damaged.

★If the rubber boot is damaged, replace the rubber boot.

★If caliper holder shaft is damaged, replace the caliper holder shaft and rubber boot as a unit.



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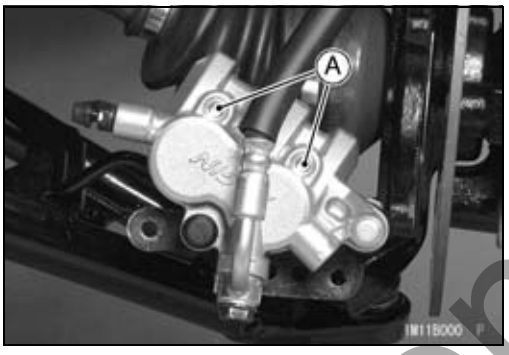
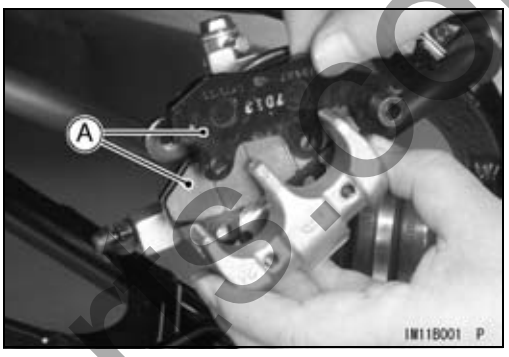
Brake Pads

Front Brake Pad Removal

- Remove the caliper with the hose installed (see Front Brake Caliper Removal).
- Remove the pad mounting bolts [A].



- Remove the brake pads [A].



Front Brake Pad Installation

- Push the caliper piston in by hand as far as it will go.
- Be sure that the anti-rattle spring is in place.
- Install:
  Brake Pads
  Pad Mounting Bolts
- Tighten:

Torque - Front Brake Pad Mounting Bolts: 17.2 N·m (1.8 kgf·m, 13 ft·lb)

⚠ WARNING

After servicing, it takes several applications of the brake lever before the brake pads contact the disc, which could result in increased stopping distance and cause an accident resulting in injury or death. Do not attempt to ride the vehicle until a firm brake lever is obtained by pumping the lever until the pads are against the disc.

Front Brake Pad Wear Inspection

- Refer to the Front Brake Pad Wear Inspection in the Periodic Maintenance chapter.

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Brake Discs

Front Brake Disc Cleaning

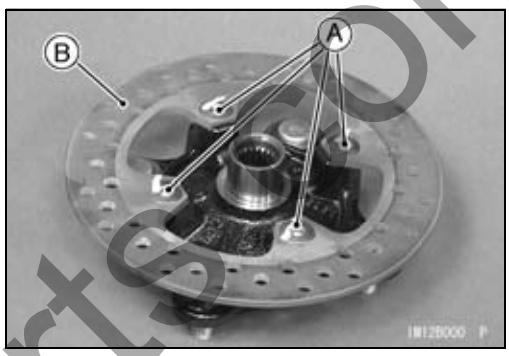
Poor braking can be caused by oil on a disc. Oil on a disc must be cleaned off with an oilless cleaning fluid such as trichloroethylene or acetone.

⚠ WARNING

These cleaning fluids are usually highly flammable and harmful if breathed for prolonged periods. Be sure to heed the fluid manufacturer's warnings.

Front Brake Disc Removal

- Remove:
  Front Hub (see Front Hub Removal in the Wheels/Tires chapter)
  Brake Disc Mounting Bolts [A]
  Brake Disc [B]

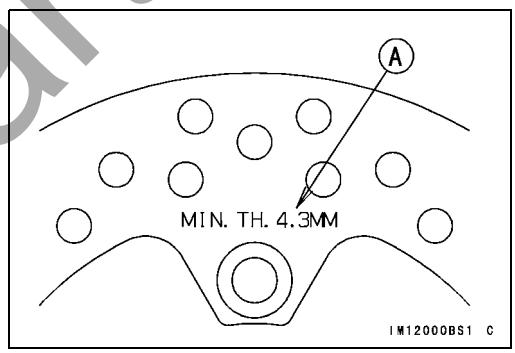


Front Brake Disc Installation

- The disc must be installed with the marked side [A] facing toward the steering knuckle.
- Apply a non-permanent locking agent to the brake disc mounting bolts.
- Tighten:

Torque - Front Brake Disc Mounting Bolts: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

- After installing the discs, check the disc runout. Completely clean off any grease that has gotten on either side of the disc with a high-flash point solvent. Do not use one which will leave an oily residue.

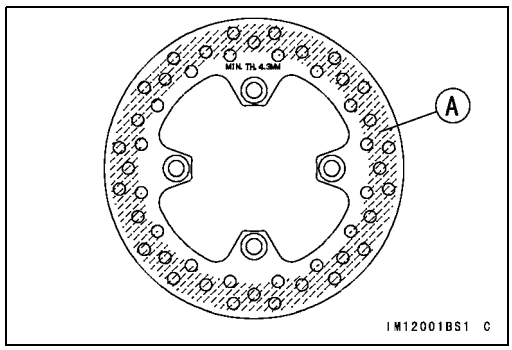


Front Brake Disc Wear Inspection

- Measure the thickness of each disc at the point [A] where it has worn the most.

★Replace the disc if it has worn past the service limit.

Disc Thickness
Standard: 4.6 ~ 5.0 mm (0.18 ~ 0.20 in.)
Service Limit: 4.3 mm (0.17 in.)

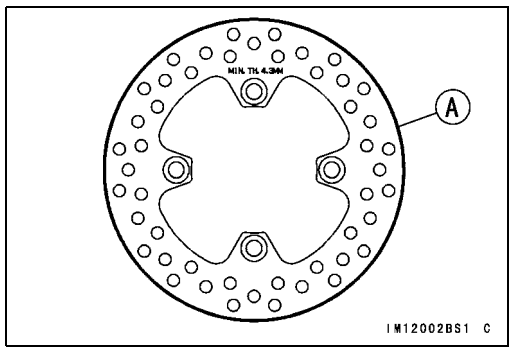


Front Brake Disc Runout Inspection

- Jack up the vehicle so that the wheels are off the ground.
- Remove the front wheels and turn the handlebar fully to one side.
- Set up a dial gauge against the disc [A], and measure the disc runout.

★If the runout exceeds the service limit, replace the disc.

Disc Runout
Standard: TIR 0.25 mm (0.010 in.) or less
Service Limit: TIR 0.3 mm (0.012 in.)



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Brake Hoses and Pipes

Brake Hose and Pipe Inspection

- Refer to the Brake Hose and Pipe Connections Inspection in the Periodic Maintenance chapter.

Brake Hose Replacement

- Refer to the Brake Hose Replacement in the Periodic Maintenance chapter.

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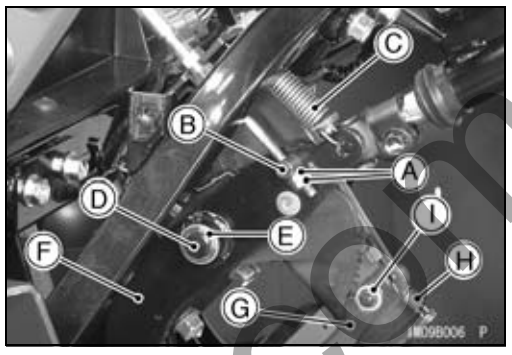
Parking Brake Pedal and Cables

Parking Brake Pedal Inspection

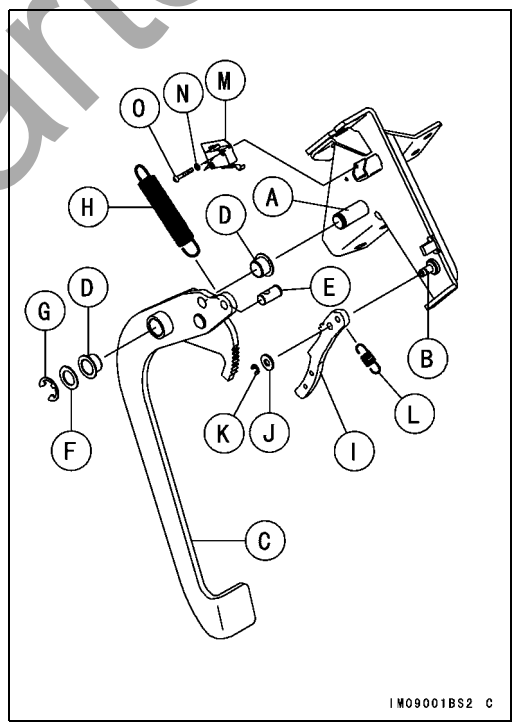
- Refer to the Parking Brake Pedal Inspection in the Periodic Maintenance chapter.

Parking Brake Pedal Removal



- Remove:
  Control Panel (see Control Panel Removal in the Frame chapter)
  Cable Locknuts [A]
- Remove the cable end from the pin [B].
- Remove:
  Spring [C]
  Circlip [D]
  Shim [E]
  Parking Brake Pedal [F]
- When removing the parking release lever [G], remove the following parts.
  Spring [H]
  Circlip and Washer [I]

Parking Brake Pedal Installation



- Apply grease:
  Parking Brake Pedal Pivot [A]
  Parking Release Lever Pivot [B]
- Install:
  Parking Brake Pedal [C]
  New Bushings [D] (press, if installing)
  Pin [E]
  Shim [F]
  New Circlip [G]
  Spring [H]
  Parking Release Lever [I]
  Washer [J]
  New Circlip [K]
  Spring [L]

★If there is the excess play in right and left directions on the parking brake pedal, replace the shim [F] to one in the following shims.

Shims

Part Number	Thickness
92180-0279	0.8 mm (0.031 in.)
92180-0281	1.0 mm (0.039 in.)
92180-0279	1.2 mm (0.047 in.)

- When installing the parking brake indicator light switch [M], install the washer [N] and tighten the parking brake indicator light switch screws [O].

Torque - Parking Brake Indicator Light Switch Screws: 0.4 N·m (0.04 kgf·m, 4 in·lb)

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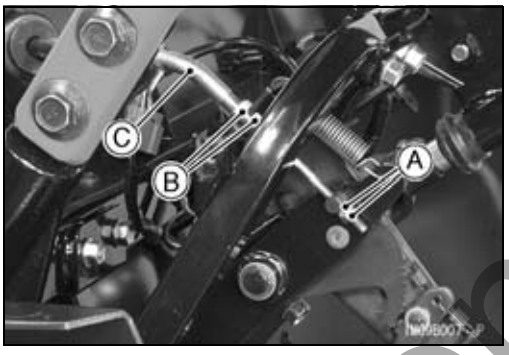
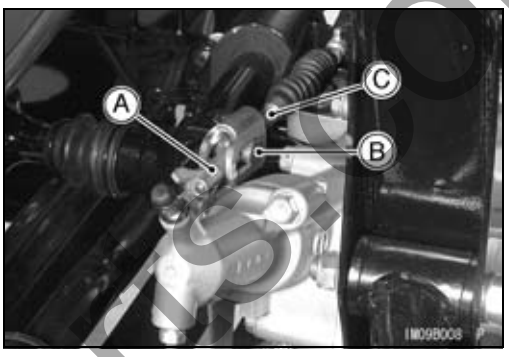
Parking Brake Pedal and Cables

Parking Brake Cable Removal

- Remove:
  Control Panel (see Control Panel Removal in the Frame chapter)
  Cable Locknuts [A]
- Loosen the cable mounting nuts [B] and remove the cable [C] from the bracket.

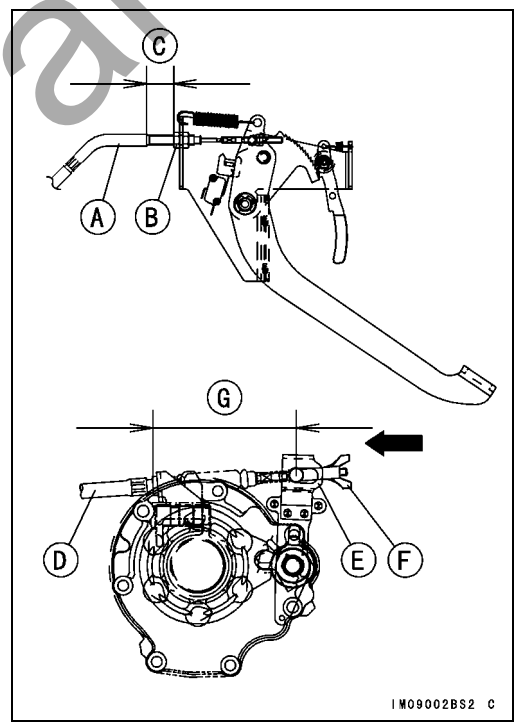


- Remove:
  Adjuster [A]
  Pin [B]
  Washer
  Spring [C]
- Remove the cable from the bracket and remove it from the frame.



Parking Brake Cable Installation

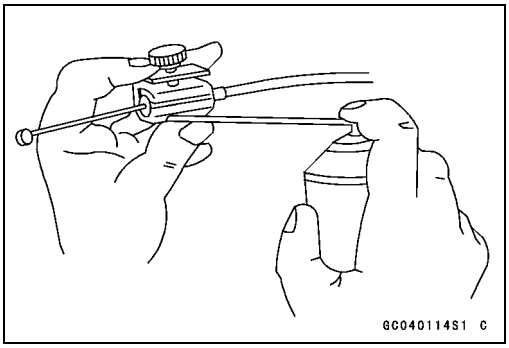
- Run the 2WD/4WD shift cable according to the Cable, Wire and Hose Routing section in the Appendix chapter.
- Install the front side of parking brake cable [A] as shown in the figure.
  Cable Mounting Nut [B]
  10 mm (0.39 in.) [C]
- Install the rear side of parking brake cable [D] as follows.
- Install the following parts in the lever [E] temporarily.
  Rear End of Parking Brake Cable
  Washer and Pin
  Adjuster [F]
- Push the lever toward cable as shown until the lever is stopped without lever return spring.
  Setting Position [G]
- Then tighten the adjuster until the pin touches the lever and return the adjuster 3 ~ 5 rotations.
- Install the return spring to the lever.
- Check the parking brake for good braking power and when the parking brake released, no brake drag.



Parking Brake Cable Lubrication

Whenever the brake cable is removed, lubricate the cable as follows:

- Lubricate the cable with a penetrating aerosol cable lubricant through the pressure cable luber.



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Internal Wet Brake

Internal Wet Brake Disassembly

- Refer to Rear Final Gear Case section in the Final Drive chapter.

Internal Wet Brake Assembly

- Refer to Rear Final Gear Case section in the Final Drive chapter.

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Suspension

Table of Contents

Exploded View 13-2
Specifications 13-6
Special Tools 13-7
Shock Absorbers (Other than KRF750S Model) 13-8
Front Shock Absorber Spring Preload Adjustment 13-8
Front Shock Absorber Removal 13-8
Front Shock Absorber Installation 13-8
Front Shock Absorber Inspection 13-9
Front Shock Absorber Scrapping 13-9
Rear Shock Absorber Spring Preload Adjustment 13-10
Rear Shock Absorber Removal 13-10
Rear Shock Absorber Installation 13-11
Rear Shock Absorber Inspection 13-11
Rear Shock Absorber Scrapping 13-12
Shock Absorbers (KRF750S Model) 13-13
Front Shock Absorber Rebound Damping Force Adjustment 13-13
Front Shock Absorber Compression Damping Force Adjustment 13-13
Front Shock Absorber Spring Preload Adjustment 13-14
Front Shock Absorber Removal 13-14
Front Shock Absorber Installation 13-14
Front Shock Absorber Inspection 13-15
Front Shock Absorber Scrapping 13-15
Rear Shock Absorber Rebound Damping Force Adjustment 13-16
Rear Shock Absorber Compression Damping Force Adjustment 13-16
Rear Shock Absorber Spring Preload Adjustment 13-17
Rear Shock Absorber Removal 13-17
Rear Shock Absorber Installation 13-18
Rear Shock Absorber Inspection 13-18
Rear Shock Absorber Scrapping 13-19
Suspension Arms 13-20
Front Suspension Arm Removal 13-20
Front Suspension Arm Installation 13-21
Front Suspension Arm Disassembly 13-22
Front Suspension Arm Assembly 13-22
Rear Suspension Arm Removal 13-23
Rear Suspension Arm Installation 13-24
Rear Suspension Arm Disassembly 13-24
Rear Suspension Arm Assembly 13-25
Stabilizer Removal 13-25
Stabilizer Installation 13-26
Stabilizer Joint Inspection 13-26
Rear Knuckle Removal 13-26
Rear Knuckle Installation 13-27
Rear Knuckle Disassembly 13-27
Rear Knuckle Assembly 13-28
Bearing and Oil Seal 13-29
Ball Bearing Inspection 13-29
Oil Seal Inspection 13-29

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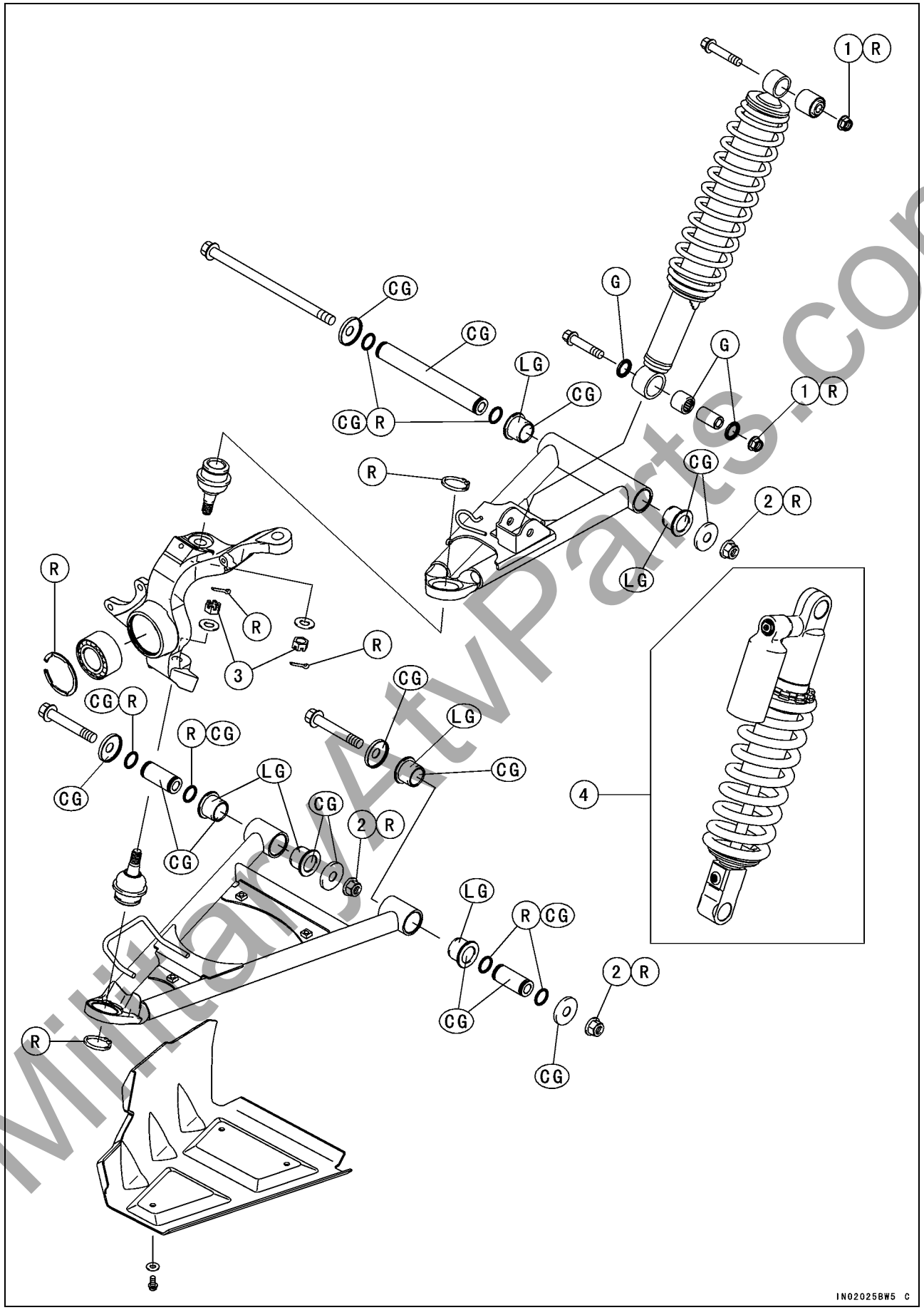
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Front Shock Absorber Mounting Nuts	57.5	5.9	42	R
2	Front Suspension Arm Pivot Nuts	87.5	8.9	65	R
3	Steering Knuckle Joint Nuts	46.5	4.7	34	

4. KRF750S Model
G: Apply grease.
LG: Apply liquid gasket (Liquid Gasket, TB1215: 92104-1065).
R: Replacement Parts
CG: Apply grease (Chevron Black Pearl Grease EP NLGI 2).

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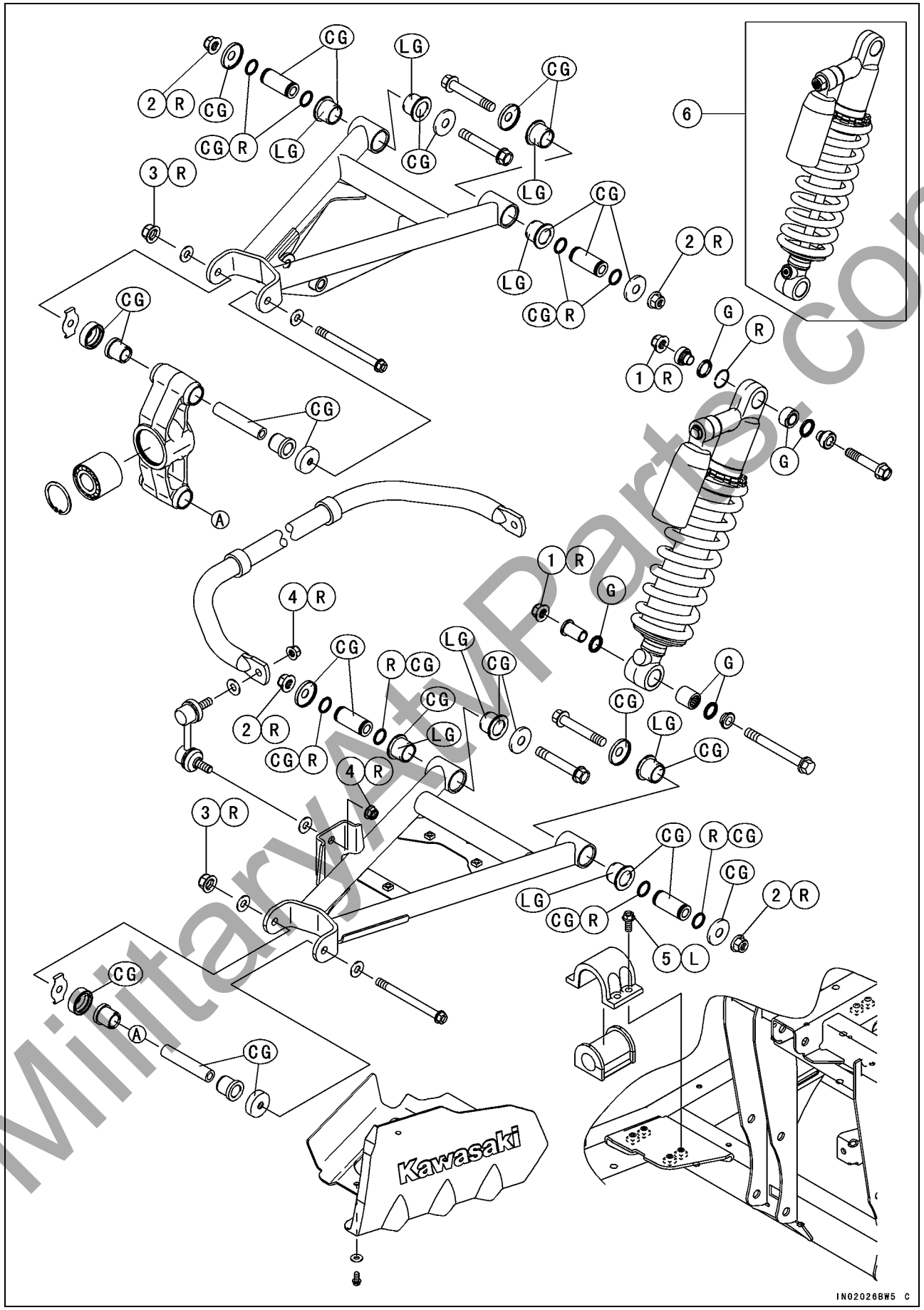
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Rear Shock Absorber Mounting Nuts	95.5	9.7	70	R
2	Rear Suspension Arm Pivot Nuts	87.5	8.9	65	R
3	Rear Knuckle Mounting Nuts	57.5	5.9	42	R
4	Stabilizer Joint Nuts	57.5	5.9	42	R
5	Stabilizer Holder Bolts	31.5	3.2	23	L

6. KRF750S Model
G: Apply grease.
L: Apply a non-permanent locking agent.
LG: Apply liquid gasket (Liquid Gasket, TB1215: 92104-1065).
R: Replacement Parts
CG: Apply grease (Chevron Black Pearl Grease EP NLGI 2).

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Specifications

Item	Standard	Service Limit
Shock Absorbers (Oher than KRF750S Model)		
Spring Preload Setting Position:		**(Usable Range)**
Front	No. 2	1 ~ 5
Rear	111.5 mm (4.390 in.)	109.5 ~ 127.5 mm (4.311 ~ 5.020 in.)
Shock Absorbers (KRF750S Model)		
Rebound Damping Force Adjustment:		
(Out from the fully tightened position)		**(Usable Range)**
Front	1 turn out	0 ~ 2.5 turns out
Rear	1 turn out	1 ~ 3 turns out
Compression Damping Force Adjustment:		
(Out from the fully tightened position)		**(Usable Range)**
Front	3.5 turns out	0 ~ 5 turns out
Rear	12 clicks out	1 ~ 20 clicks
Spring Preload Setting Position:		**(Usable Range)**
Front	82.5 mm (3.248 in.)	75.5 ~ 95.5 mm (2.972 ~ 3.760 in.)
Rear	116.0 mm (4.567 in.)	109.5 ~ 127.5 mm (4.311 ~ 5.020 in.)

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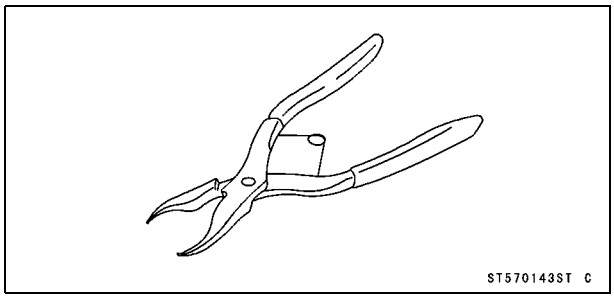
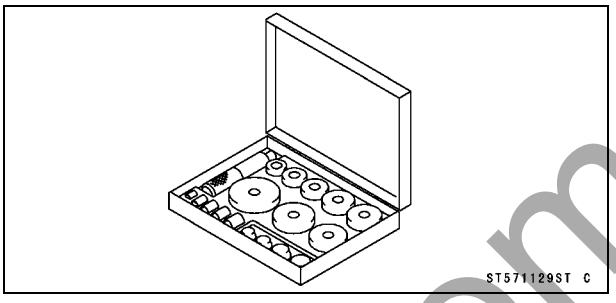
Special Tools

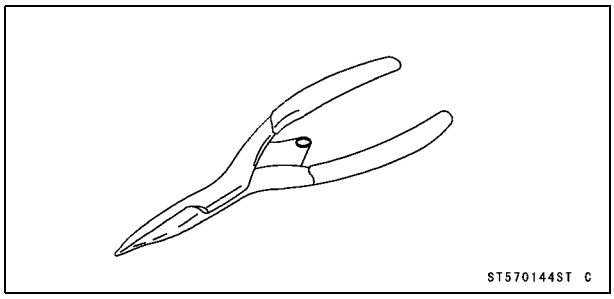
Inside Circlip Pliers:
57001-143



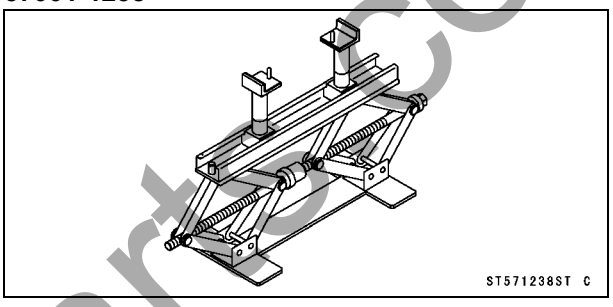
Bearing Driver Set:
57001-1129



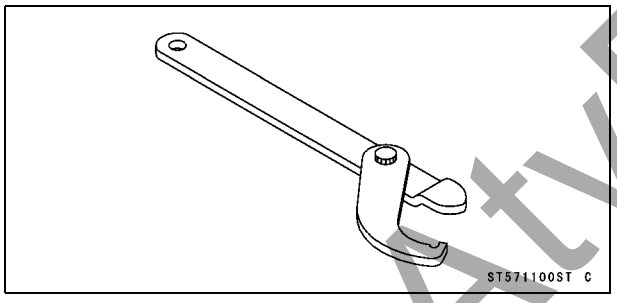
Outside Circlip Pliers:
57001-144



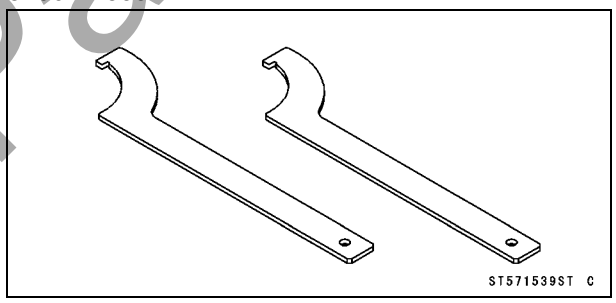
Jack:
57001-1238



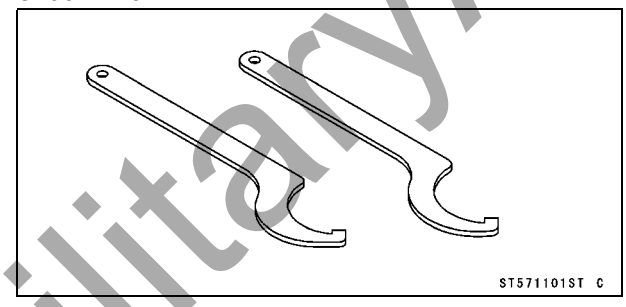
Steering Stem Nut Wrench:
57001-1100



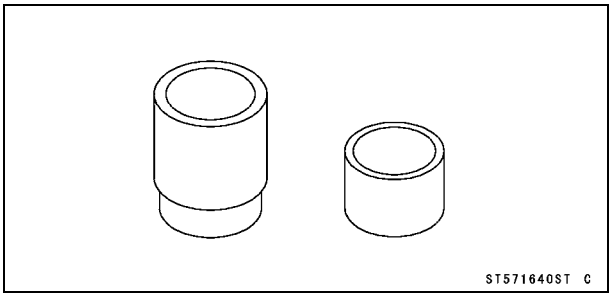
Hook Wrench T=3.2 R37:
57001-1539



Hook Wrench R37.5, R42:
57001-1101



Knuckle Joint Driver:
57001-1640



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Shock Absorbers (Other than KRF750S Model)

Front Shock Absorber Spring Preload Adjustment

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Using the nut wrench, turn the adjusting sleeve [A] to adjust the spring preload.

Special Tool - Steering Stem Nut Wrench: 57001-1100

○The standard adjuster setting for average-build rider of 68 kg (150 lb) with no passenger and no accessories is **2th** position.

Spring Preload Setting

Standard Position: **2th position**

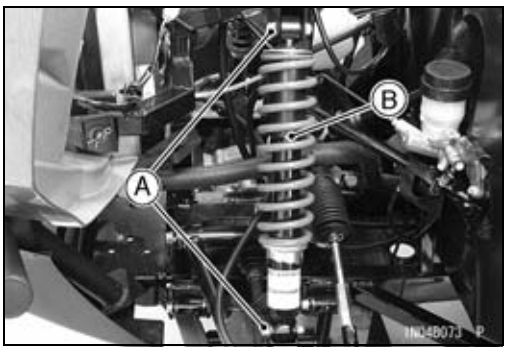
Adjustable Range: **1st ~ 5th position**

- If the compression of the spring is not suited to the operating conditions, adjust it to an appropriate position by referring to the table below.

Spring Preload Adjustment

Adjuster Position	Damping Force	Shock Absorber Hardness	Load	Road Conditions	Driving Speed
1st	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
5th	Strong	Hard	Heavy	Bad	High

Front Shock Absorber Removal

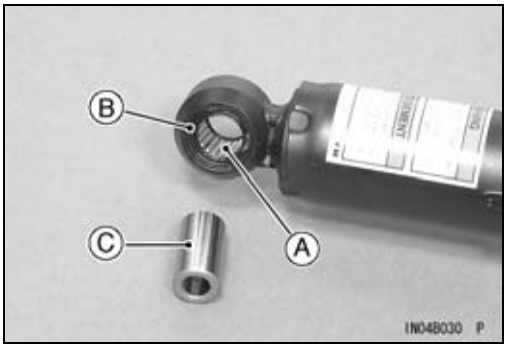


- Support the vehicle on a stand or a jack so that the front wheels are off the ground.

Special Tool - Jack: 57001-1238

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- While holding the front wheels, remove the lower and upper shock absorber mounting bolts [A] and nuts.
- Remove the front shock absorber [B].

Front Shock Absorber Installation



- Apply grease to the inside of needle bearing [A] and grease seal lips [B].
- Install the collar [C]

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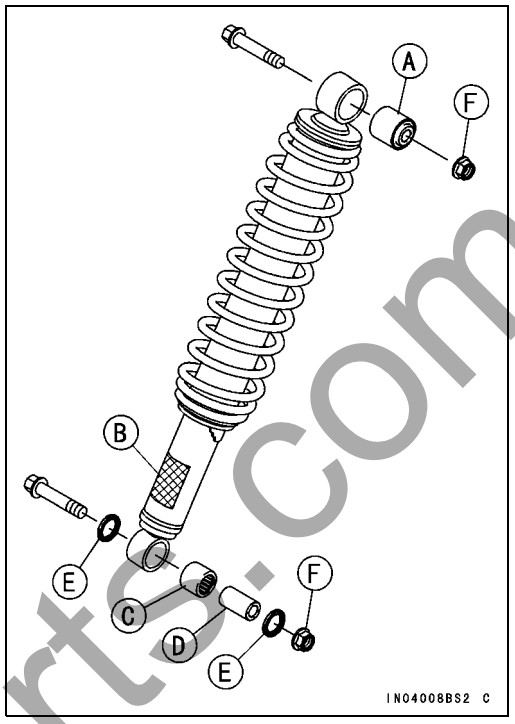
Shock Absorbers (Other than KRF750S Model)

- Install the bushing [A] using a press.
- Install the front shock absorber so that the label side [B] faces outside.
  [C] Needle Bearing
  [D] Collar
  [E] Grease Seals
  [F] New Nuts
- Tighten:

Torque - Front Shock Absorber Mounting Nuts: 57.5 N·m (5.9 kgf·m, 42 ft·lb)



Front Shock Absorber Inspection

- Check the bushing in the upper pivot.

★If bushing is worn, cracked, hardened, or otherwise damaged, replace it.

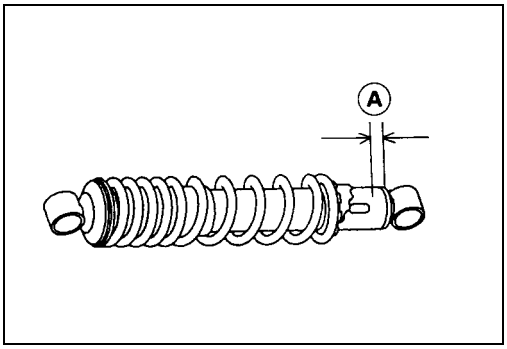
- Check the needle bearing and grease seals in the lower pivot.

★If they are damaged, replace them.

Front Shock Absorber Scrapping

⚠ WARNING

Since the front shock absorber contains nitrogen gas, do not incinerate or disassemble the front shock absorber. Before a front shock absorber is scrapped, drill a hole at a point about 15mm (0.59 in.) [A] up from the bottom of the cylinder to release the nitrogen gas completely. Wear safety glasses when drilling the hole, as the gas may blow out bits of drilled metal when the hole opens.



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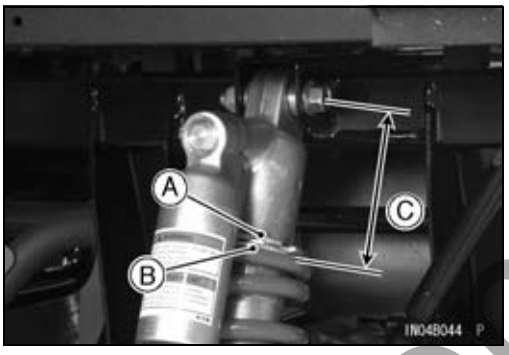
Shock Absorbers (Other than KRF750S Model)

Rear Shock Absorber Spring Preload Adjustment



- Loosen the locknut [A].
- Turn the adjusting nut [B] to the desired position.

Special Tool - Hook Wrench T = 3.2, R37: 57001-1539

Adjusting Length [C]:

from center of upper mounting bolt to lower surface of adjusting nut

○The standard adjusting nut setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is **111.5 mm (4.390 in.)** spring length.

Spring Preload Setting

Standard: **Adjusting length 111.5 mm (4.390 in.)**

Usable Range: **Adjusting length 109.5 ~ 127.5 mm (4.311 ~ 5.020 in.)**

- Tighten the locknut.

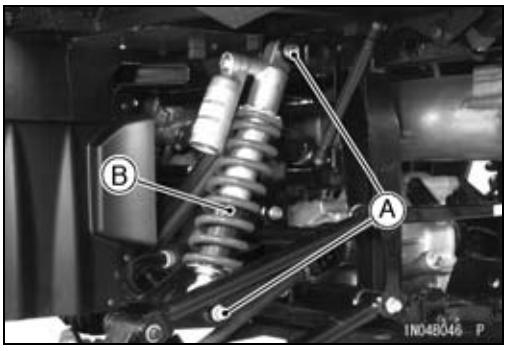
★If the spring action feels too soft or too stiff, adjust it.

Spring Preload Adjustment

Adjusting Length	Damping Force	Setting	Load	Road	Speed
109.5 mm (4.311 in.)	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
127.5 mm (5.020 in.)	Strong	Hard	Heavy	Bad	High

Rear Shock Absorber Removal

- Remove:
  Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)
  Guard [A], Bolts and Washer



- Remove:
  Rear Shock Absorber Mounting Bolts [A] and Nuts
  Rear Shock Absorber [B]

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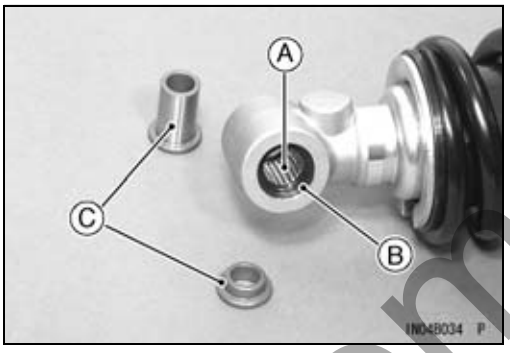
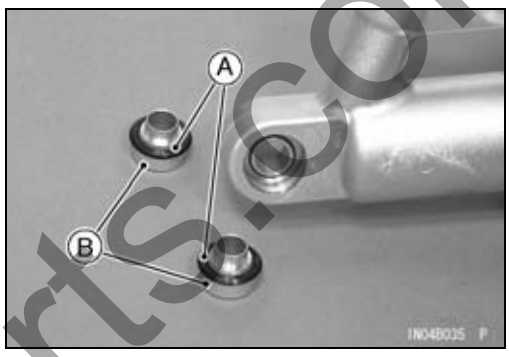
Shock Absorbers (Other than KRF750S Model)

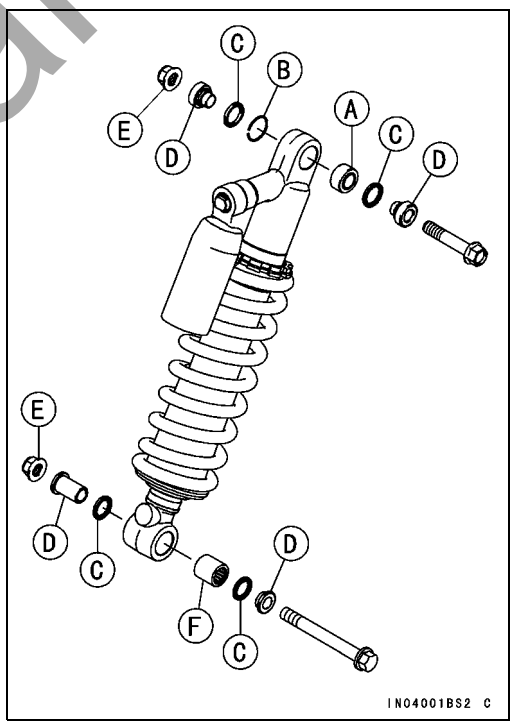
Rear Shock Absorber Installation



- Apply grease to the inside of needle bearing [A] and grease seal lips [B].
- Install the collars [C].



- Apply grease to the grease seal lips [A].
- Install the collars [B].



- When replacing the ball bearing [A], install the new circlip [B].
  - [C] Grease Seals
  - [D] Collars
  - [E] New Nuts
  - [F] Needle Bearing
- Tighten:

Torque - Rear Shock Absorber Mounting Nuts: 95.5 N·m (9.7 kgf·m, 70 ft·lb)

- Install the removed parts (see appropriate chapters).

Rear Shock Absorber Inspection

- Check the ball bearing and grease seals in the upper pivot.

★If they are damaged, replace them.

- Check the needle bearing and grease seals in the lower pivot.

★If they are damaged, replace them.

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Shock Absorbers (Other than KRF750S Model)

Rear Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the rear shock absorber. (see Rear Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

⚠ WARNING

Drilling will release high pressure gas that may blow metal shavings at high speed and cause eye injury. Wear safety goggles or face shield when drilling the reservoir tank.

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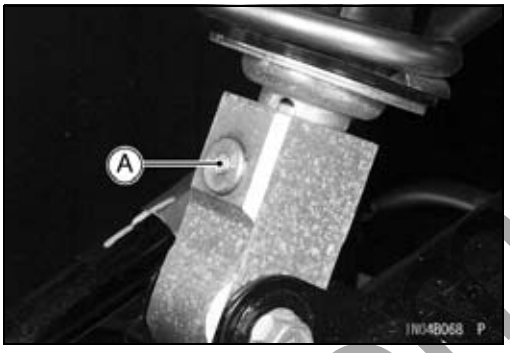
Shock Absorbers (KRF750S Model)

Front Shock Absorber Rebound Damping Force Adjustment

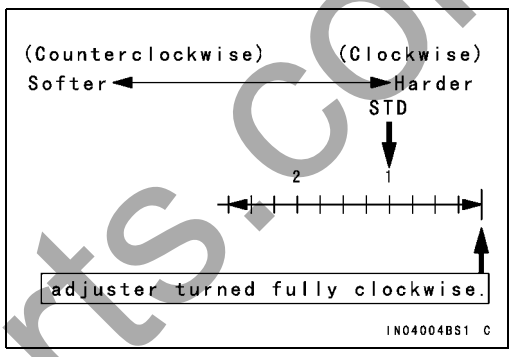


- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- To adjust the rebound damping force, turn the rebound damping force adjuster [A] to the desired position.

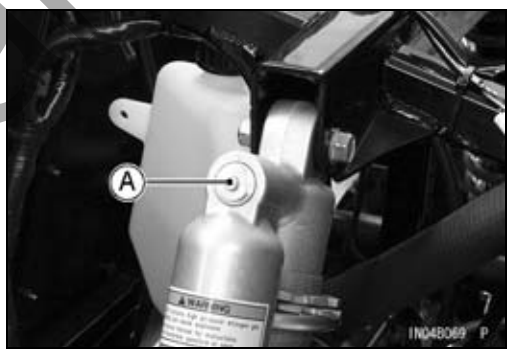
○The standard adjuster setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is the **1 turn out** from the fully clockwise position.

Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
2.5 Turns Out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High



Front Shock Absorber Compression Damping Force Adjustment

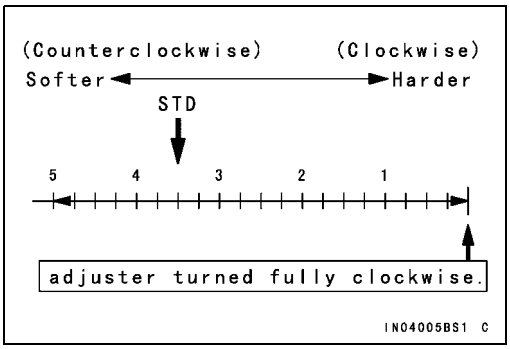


- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- To adjust the compression damping force, turn the compression damping force adjuster [A] to the desired position.

○The standard adjuster setting for the average-build rider of 68 kg (150 lb) with no passenger and no accessories is the **3.5 turns out** from the fully clockwise position.

Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
5 Turns Out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High



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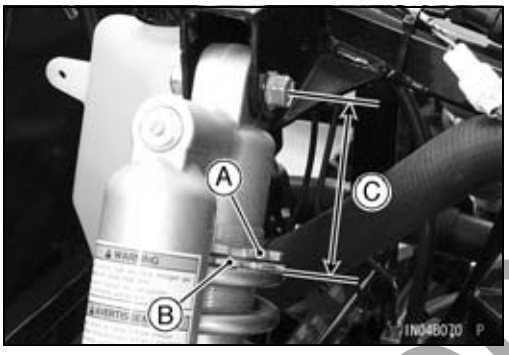
Shock Absorbers (KRF750S Model)

Front Shock Absorber Spring Preload Adjustment



- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Loosen the locknut [A].
- Turn the adjusting nut [B] to the desired position.

Special Tool - Hook Wrench R37.5, R42: 57001-1539

Adjusting Length [C]:

from center of upper mounting bolt to lower surface of adjusting nut

○The standard adjusting nut setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is **82.5 mm (3.248 in.)** spring length.

Spring Preload Setting

Standard: **Adjusting length 8.25 mm (3.248 in.)**

Usable Range: **Adjusting length 75.5 ~ 95.5 mm (2.972 ~ 3.760 in.)**

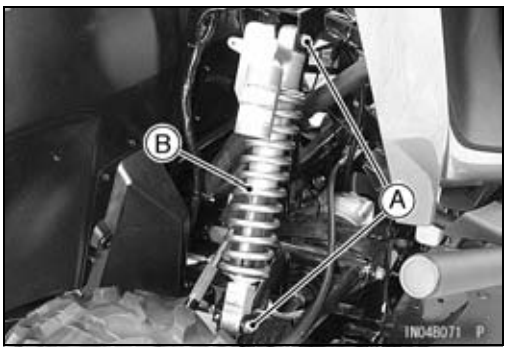
- Tighten the locknut.

★If the spring action feels too soft or too stiff, adjust it.

Spring Preload Adjustment

Adjusting Length	Damping Force	Setting	Load	Road	Speed
75.5 mm (2.972 in.)	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
95.5 mm (3.760 in.)	Strong	Hard	Heavy	Bad	High

Front Shock Absorber Removal

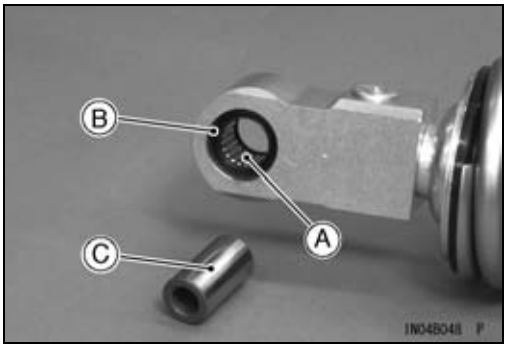


- Support the vehicle on a stand or a jack so that the front wheels are off the ground.

Special Tool - Jack: 57001-1238

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- While holding the front wheels, remove the lower and upper shock absorber mounting bolts [A] and nuts.
- Remove the front shock absorber [B].

Front Shock Absorber Installation



- Apply grease to the inside of needle bearing [A] and grease seal lips [B].
- Install the collar [C]

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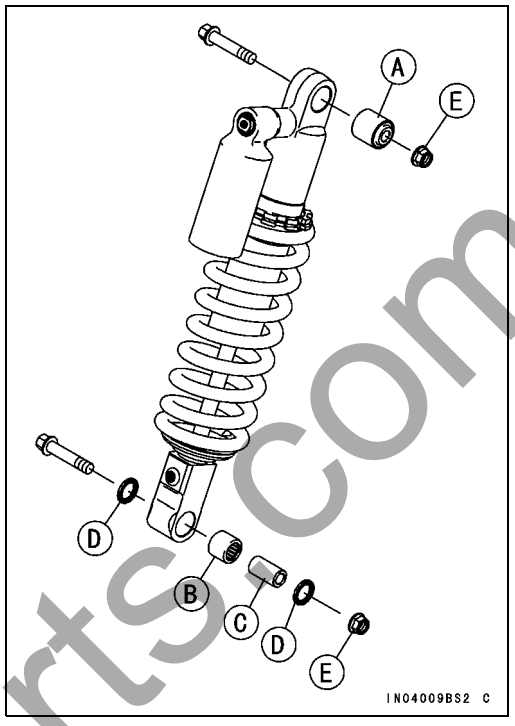
Shock Absorbers (KRF750S Model)

- Install the bushing [A] using a press.
  [B] Needle Bearing
  [C] Collar
  [D] Grease Seals
  [E] New Nuts
- Tighten:

Torque - Front Shock Absorber Mounting Nuts: 57.5 N·m (5.9 kgf·m, 42 ft·lb)



Front Shock Absorber Inspection

- Check the bushing in the upper pivot.

★If bushing is worn, cracked, hardened, or otherwise damaged, replace it.

- Check the needle bearing and grease seals in the lower pivot.

★If they are damaged, replace them.

Front Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the front shock absorber. (see Front Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

⚠ WARNING

Drilling will release high pressure gas that may blow metal shavings at high speed and cause eye injury. Wear safety goggles or face shield when drilling the reservoir tank.

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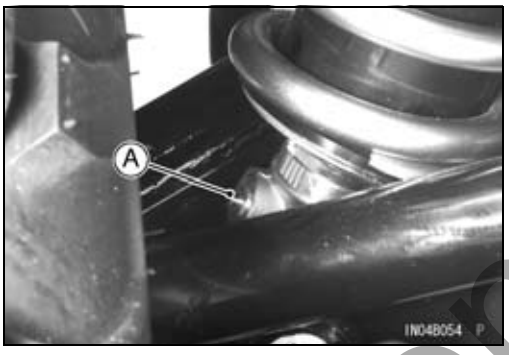
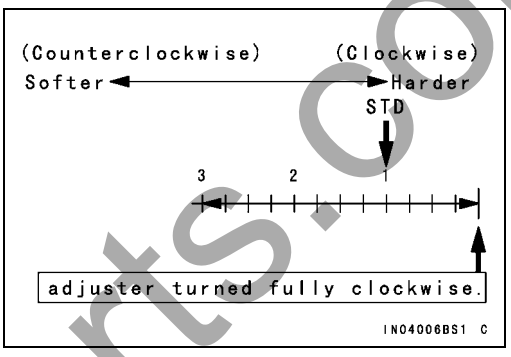
Shock Absorbers (KRF750S Model)

Rear Shock Absorber Rebound Damping Force Adjustment

- To adjust the rebound damping force, turn the rebound damping force adjuster [A] to the desired position.

○The standard adjuster setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is the **1 turn out** from the fully clockwise position.





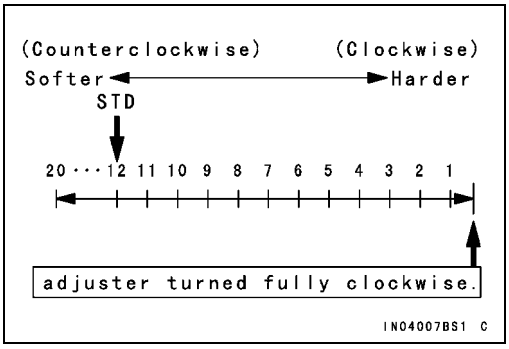
Rebound Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
3 Turns Out	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
0	Strong	Hard	Heavy	Bad	High

Rear Shock Absorber Compression Damping Force Adjustment

- To adjust the compression damping force, turn the compression damping force adjuster [A] to the desired position until you feel a click.

○The standard adjuster setting for the average-build rider of 68 kg (150 lb) with no passenger and no accessories is the **12th click** from the 1st click of the fully clockwise position.



Compression Damping Force Adjustment

Adjuster Position	Damping Force	Setting	Load	Road	Speed
20	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
1	Strong	Hard	Heavy	Bad	High

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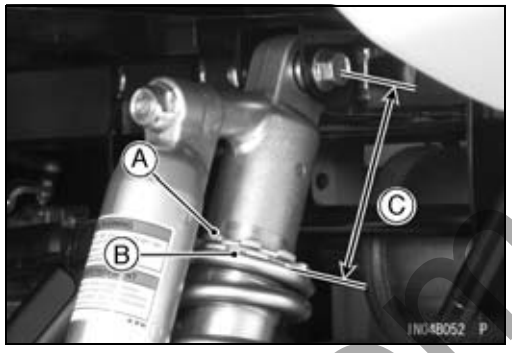
Shock Absorbers (KRF750S Model)

Rear Shock Absorber Spring Preload Adjustment



- Loosen the locknut [A].
- Turn the adjusting nut [B] to the desired position.

Special Tool - Hook Wrench R37.5, R42: 57001-1101

Adjusting Length [C]:

from center of upper mounting bolt to lower surface of adjusting nut

○The standard adjusting nut setting for an average-build rider of 68 kg (150 lb) with no passenger and no accessories is **116.0 mm (4.567 in.)** spring length.

Spring Preload Setting

Standard: **Adjusting length 116.0 mm (4.567 in.)**

Usable Range: **Adjusting length 109.5 ~ 127.5 mm (4.311 ~ 5.020 in.)**

- Tighten the locknut.

★If the spring action feels too soft or too stiff, adjust it.

Spring Preload Adjustment

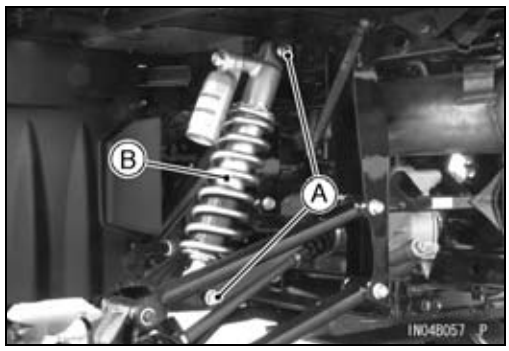
Adjusting Length	Damping Force	Setting	Load	Road	Speed
109.5 mm (4.311 in.)	Weak	Soft	Light	Good	Low
↑	↑	↑	↑	↑	↑
↓	↓	↓	↓	↓	↓
127.5 mm (5.020 in.)	Strong	Hard	Heavy	Bad	High

Rear Shock Absorber Removal

- Remove:

Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)

Guard [A], Bolts and Washer



- Remove:

Rear Shock Absorber Mounting Bolts [A] and Nuts

Rear Shock Absorber [B]

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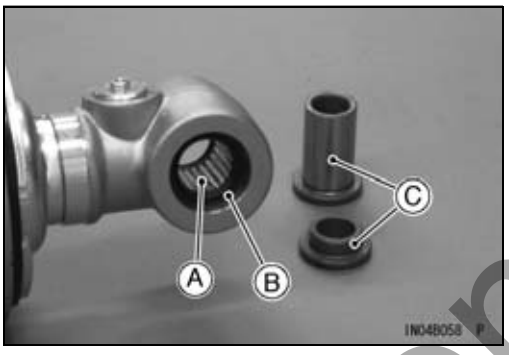
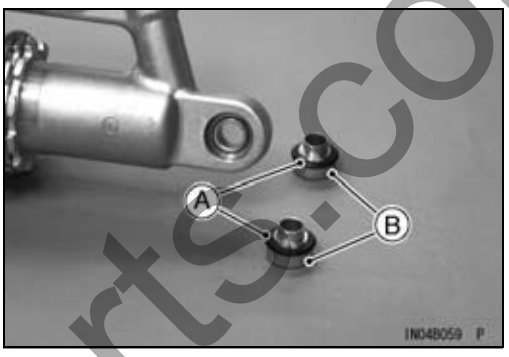
Shock Absorbers (KRF750S Model)

Rear Shock Absorber Installation

- Apply grease to the inside of needle bearing [A] and grease seal lips [B].
- Install the collars [C].



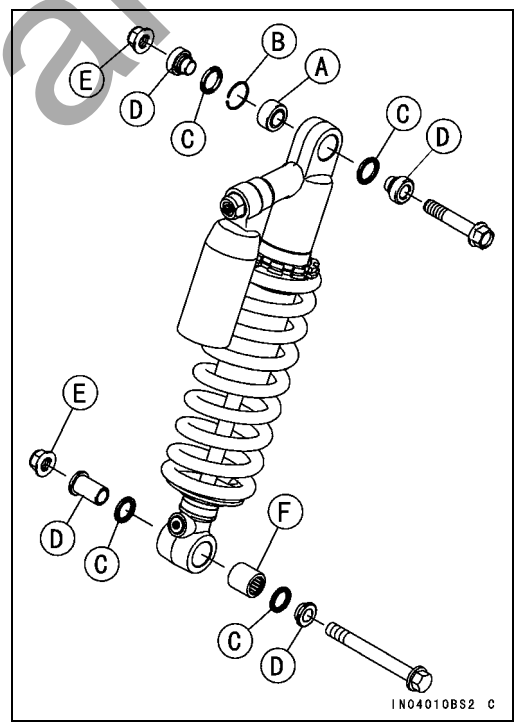
- Apply grease to the grease seal lips [A].
- Install the collars [B].



- When replacing the ball bearing [A], install the new circlip [B].
  [C] Grease Seals
  [D] Collars
  [E] New Nuts
  [F] Needle Bearing
- Tighten:

Torque - Rear Shock Absorber Mounting Nuts: 95.5 N·m (9.7 kgf·m, 70 ft·lb)

- Install the removed parts (see appropriate chapters).



Rear Shock Absorber Inspection

- Check the ball bearing and grease seals in the upper pivot.

★If they are damaged, replace them.

- Check the needle bearing and grease seals in the lower pivot.

★If they are damaged, replace them.

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Shock Absorbers (KRF750S Model)

Rear Shock Absorber Scrapping

⚠ WARNING

Pressurized nitrogen may explode when heated. The rear shock contains nitrogen gas. To avoid an explosion, do not incinerate the shock body without first releasing the nitrogen and removing the shraeder valve.

- Remove the rear shock absorber. (see Rear Shock Absorber Removal).
- Drill the hole [A] of the reservoir tank using about 2 mm (0.08 in.) drillbit.

⚠ WARNING

Drilling will release high pressure gas that may blow metal shavings at high speed and cause eye injury. Wear safety goggles or face shield when drilling the reservoir tank.

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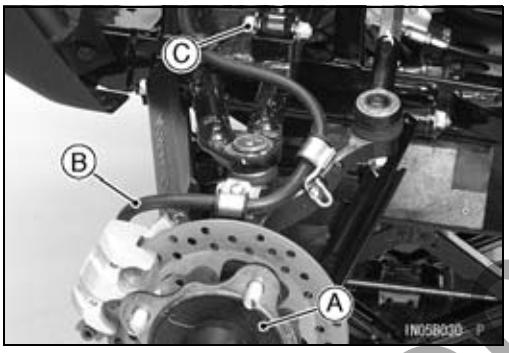
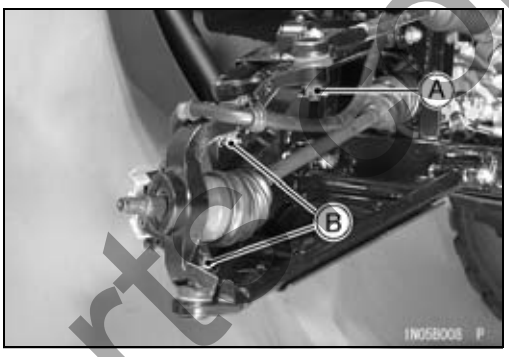
Suspension Arms

Front Suspension Arm Removal

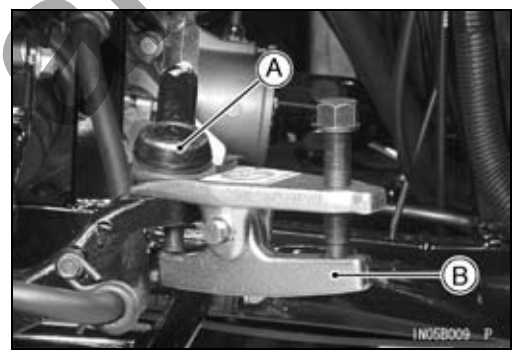
- Remove:
  Front Wheels (see Wheel Removal in the Wheels/Tires chapter)
  Front Hub [A] (see Front Hub Removal in the Wheels/Tires chapter)
  Brake Caliper and Hose [B] (from Suspension Arm)
  Front Shock Absorber Mounting Bolt [C] and Nut (lower)



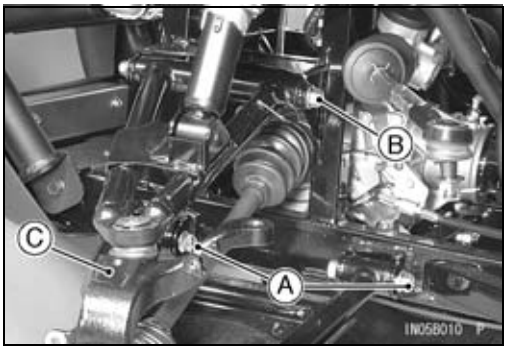
- Remove:
  Cotter Pins
  Tie-rod End Nut [A]
  Knuckle Joint Nuts [B]



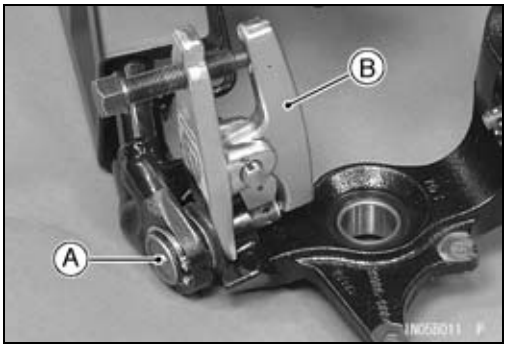
- Remove the tie-rod end [A] from the knuckle using a suitable joint remover [B].



- Remove:
  Front Lower Suspension Arm Pivot Bolts, Caps and Nuts [A]
  Front Upper Suspension Arm Pivot Bolt, Caps and Nut [B]
  Knuckle [C] and Front Suspension Arms Assembly



- Remove the knuckle joints [A] from the knuckle using a suitable joint remover [B].



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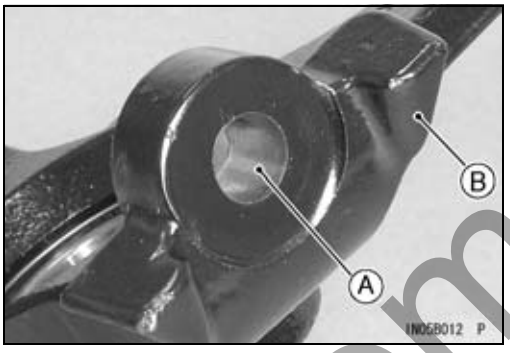
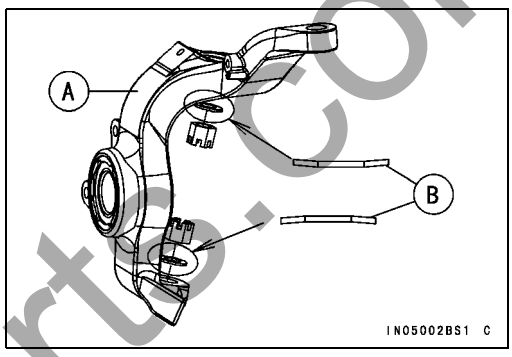
Suspension Arms

Front Suspension Arm Installation



- Clean the taper surface [A] of the knuckle [B] and shank of the knuckle joint, or the tapers will not fit snugly.
- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the inside of the caps.
- Install:
  Front Upper Suspension Arm
  Front Lower Suspension Arm
  Suspension Arm Pivot Bolts, Caps and Nuts (temporary)
  Front Shock Absorber Mounting Bolt and Nut (lower)

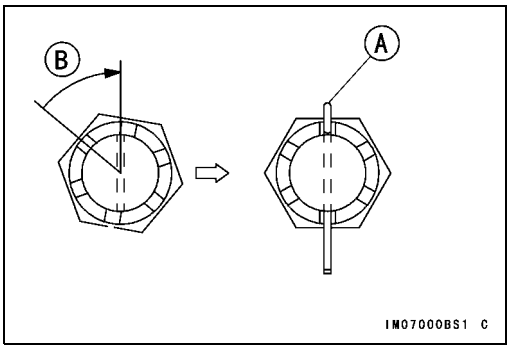


- Install:
  Knuckle [A], Washers [B] and Nuts

○Install the washer as shown in the figure.

- Tighten:

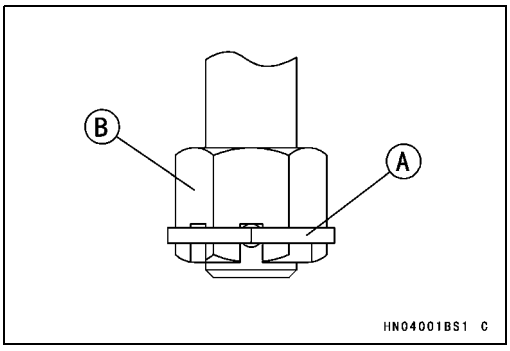
Torque - Front Suspension Arm Pivot Nuts: 87.5 N·m (8.9 kgf·m, 65 ft·lb)
Steering Knuckle Joint Nuts: 46.5 N·m (4.7 kgf·m, 34 ft·lb)
Front Shock Absorber Mounting Nut: 57.5 N·m (5.9 kgf·m, 42 ft·lb)



- Install:
  New Cotter Pins [A]

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degree.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



- Bend the cotter pin [A] over the nut [B].

- Install the removed parts (see appropriate chapter).

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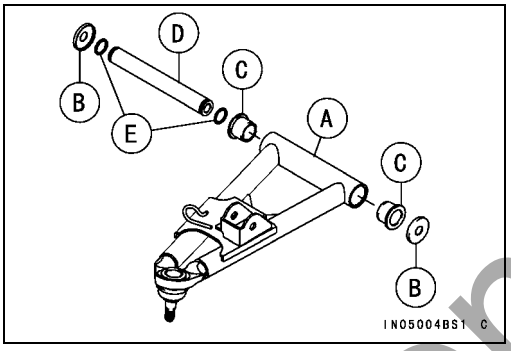
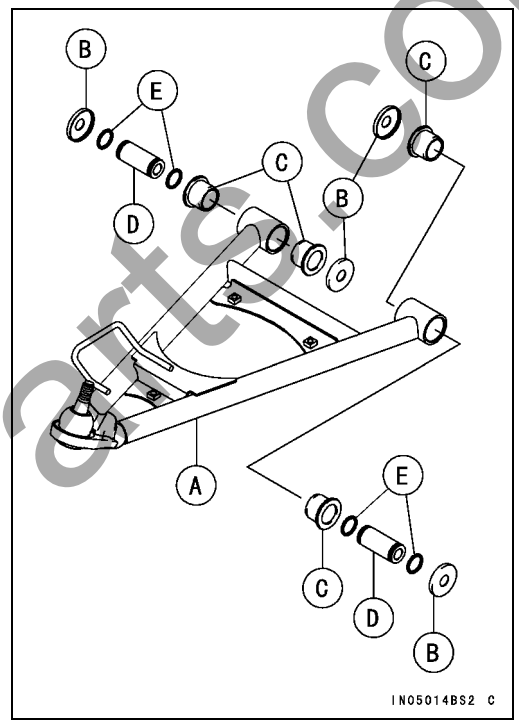
Suspension Arms

Front Suspension Arm Disassembly

- Remove:
  Upper Suspension Arm [A]
  Caps [B]
  Bushings [C]
  Sleeve [D]
  O-rigs [E]

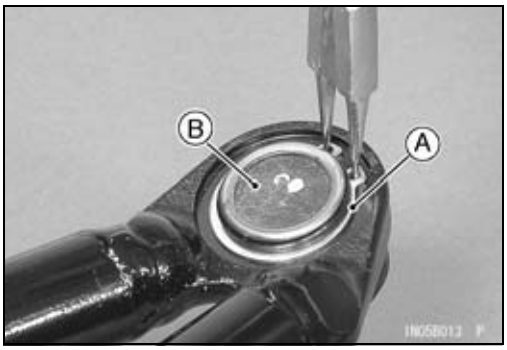


- Remove:
  Lower Suspension Arm [A]
  Caps [B]
  Bushings [C]
  Sleeve [D]
  O-rigs [E]



- Remove:
  Circlip [A]

  Special Tool - Outside Circlip Pliers: 57001-144
- Remove the knuckle joint [B] using a press.

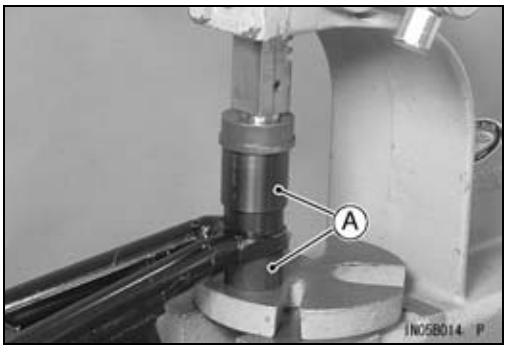


Front Suspension Arm Assembly

- Press the new knuckle joint using a press.

  Special Tool - Knuckle Joint Driver [A]: 57001-1640
- Install:
  New Circlip

  Special Tool - Outside Circlip Pliers: 57001-144



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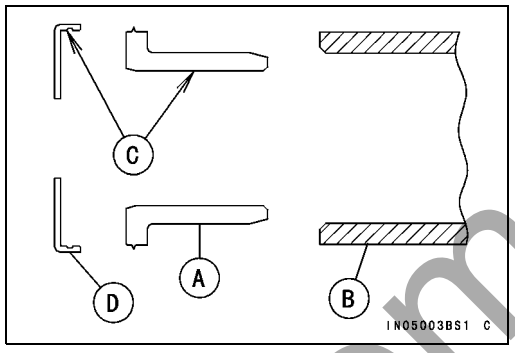
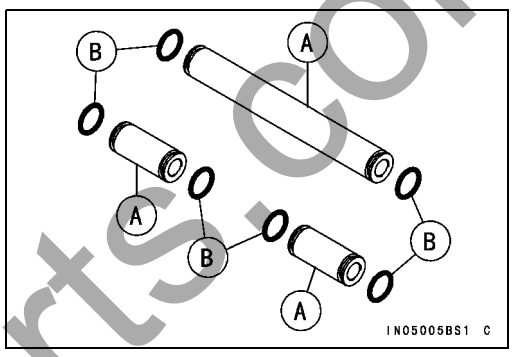
Suspension Arms

- Apply adhesive (Three Bond: 1215) to outside of the bushing [A] and install it into the suspension arm [B].
- Wipe off any extra adhesive.
- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the inside [C] of the bushing and cap [D].

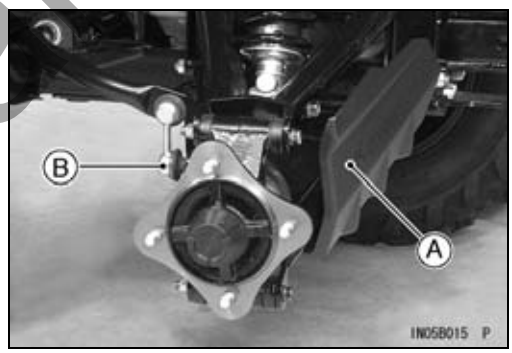


- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the sleeves [A] and new O-rings [B].

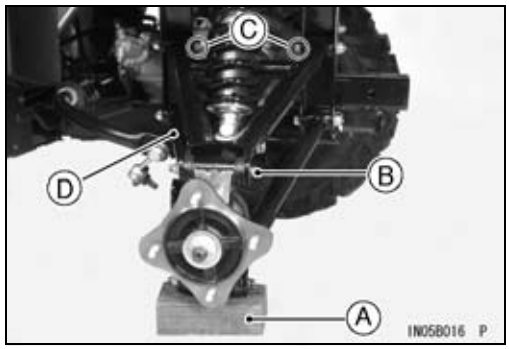


Rear Suspension Arm Removal

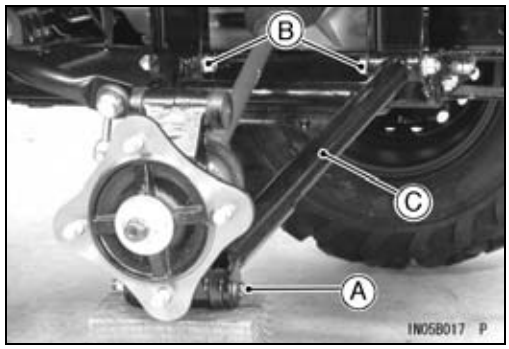
- Remove:
  Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)
  Axle Guard [A]
  Stabilizer Joint [B] (see Stabilizer Removal)



- Support the rear hub using a suitable jack or block [A].
- Remove:
  Rear Shock Absorber Bolt, Washer and Nut (lower)
  Rear Knuckle Mounting Bolt [B], Washers, Shim and Nut
  Rear Upper Suspension Arm Pivot Bolts [C], Caps and Nuts
  Rear Upper Suspension Arm [D]



- Remove:
  Rear Lower Suspension Arm Pivot Bolts [A], Washers, Shim and Nut
  Rear Lower Suspension Arm Pivot Bolts [B], Caps and Nuts
  Rear Lower Suspension Arm [C]



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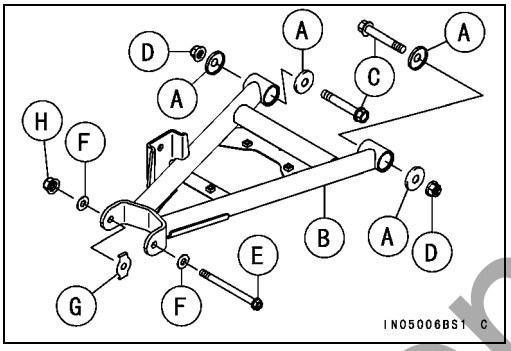
Suspension Arms

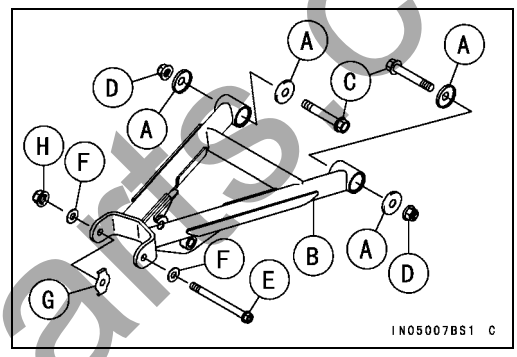
Rear Suspension Arm Installation



- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the inside of the caps [A].
- Install:
  Rear Lower Suspension Arm [B]
  Rear Lower Suspension Arm Pivot Bolts [C], Caps and New Nuts [D] (temporary)
  Rear Knuckle Mounting Bolt [E], Washers [F], Shim [G] and New Nuts [H] (temporary)

★If there are over 0.5 mm (0.02 in.) gap between the knuckle and lower suspension arm, add the shim [G] to front side.

- Support the rear hub using a suitable jack or block.



- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the inside of the caps [A].
- Install:
  Rear Upper Suspension Arm [B]
  Rear Upper Suspension Arm Pivot Bolts [C], Caps and New Nuts [D] (temporary)
  Rear Knuckle Mounting Bolt [E], Washers [F], Shim [G] and New Nuts [H] (temporary)

★If there are over 0.5 mm (0.02 in.) gap between the knuckle and upper suspension arm, add the shim [G] to front side.

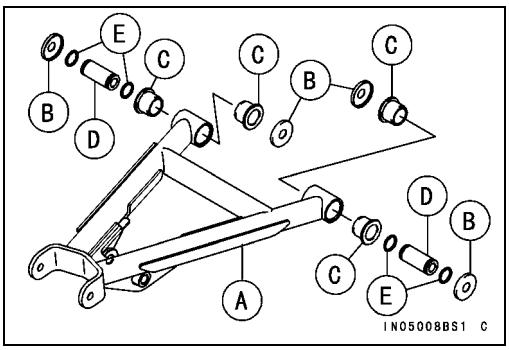
- Install:
  Rear Shock Absorber Mounting Bolt, Washer and Nut (lower)

- Tighten:

Torque - Rear Suspension Arm Pivot Nuts: 87.5 N·m (8.9 kgf·m, 65 ft·lb)
Rear Knuckle Mounting Nuts: 57.5 N·m (5.9 kgf·m, 42 ft·lb)
Rear Shock Absorber Mounting Nuts: 95.5 N·m (9.7 kgf·m, 70 ft·lb)

- Install:
  Stabilizer Joint (see Stabilizer Installation)
  Rear Wheel (see Wheel Installation in the Wheels/Tires chapter)

Rear Suspension Arm Disassembly



- Remove:
  Upper Suspension Arm [A]
  Caps [B]
  Bushings [C]
  Sleeve [D]
  O-rigs [E]

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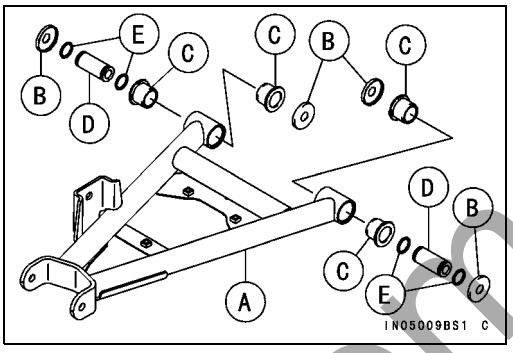
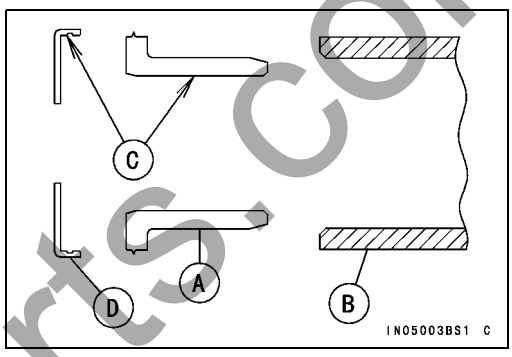
Suspension Arms

- Remove:
  Lower Suspension Arm [A]
  Caps [B]
  Bushings [C]
  Sleeve [D]
  O-rigs [E]

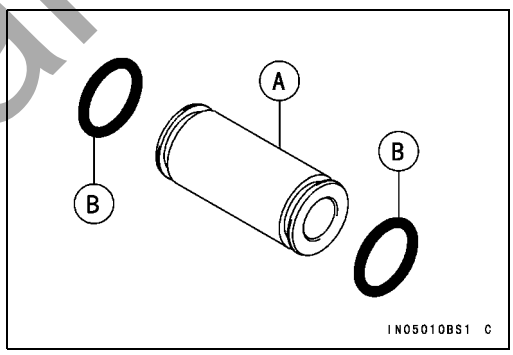


Rear Suspension Arm Assembly

- Apply adhesive (Three Bond: 1215) to outside of the bushing [A] and install it into the suspension arm [B].
- Wipe off any extra adhesive.
- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the inside [C] of the bushing and cap [D].



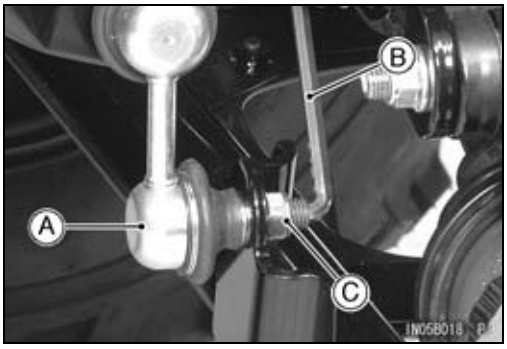
- Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the sleeves [A] and New O-rings [B] of the upper and lower suspension arms.



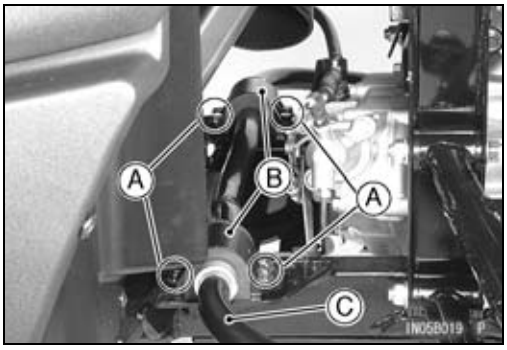
Stabilizer Removal

- Remove:
  Rear Wheels (see Wheel Removal in the Wheels/Tires chapter)
  Stabilizer Joint [A]

○Hold the joint bolt with an Allen wrench [B], and remove the nut [C].



- Remove:
  Stabilizer Holder Bolts [A]
  Stabilizer Holders [B]
  Dampers and Stabilizer [C]



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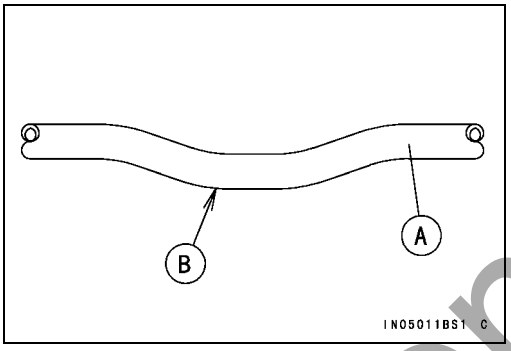
Suspension Arms

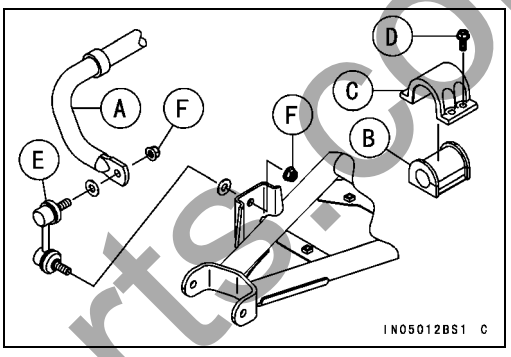
Stabilizer Installation

- Install the stabilizer [A] so that the recess side [B] faces to lower side.



- Install:
  Stabilizer [A]
  Dampers [B] (both sides)
  Stabilizer Holders [C] and Bolts (both sides)
- Apply a non-permanent locking agent to the stabilizer holder bolts.
- Tighten:

Torque - Stabilizer Holder Bolts [D]: 31.5 N·m (3.2 kgf·m, 23 ft·lb)



- Install:
  Stabilizer Joints [E] (both sides)
  New Stabilizer Joint Nuts [F]

○Hold the joint bolt with an Allen wrench, and tighten the nut.

Torque - Stabilizer Joint Nuts [F]: 57.5 N·m (5.9 kgf·m, 42 ft·lb)

- Install:
  Rear Wheels (see Wheel Installation in the Wheels/Tires chapter)

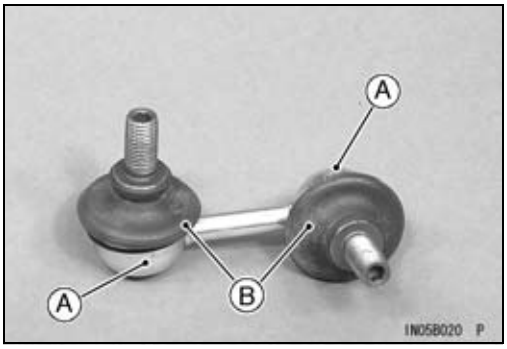
Stabilizer Joint Inspection

- Remove:
  Stabilizer Joint (see stabilizer Removal)
- Inspect each spherical bearing [A].

★If roughness, excessive play, or seizure is found, replace the stabilizer joint.

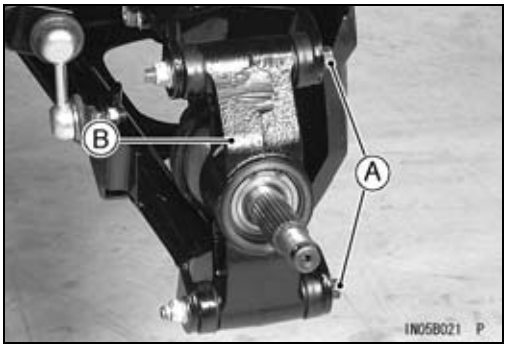
- Inspect each boot [B].

★If damage, wear or deterioration is found, replace the stabilizer joint.



Rear Knuckle Removal

- Remove:
  Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)
  Rear Hub (see Rear Hub Removal in the Wheels/Tires chapter)
- Remove:
  Rear Knuckle Mounting Bolts [A], washers and Nuts
  Rear Knuckle [B]



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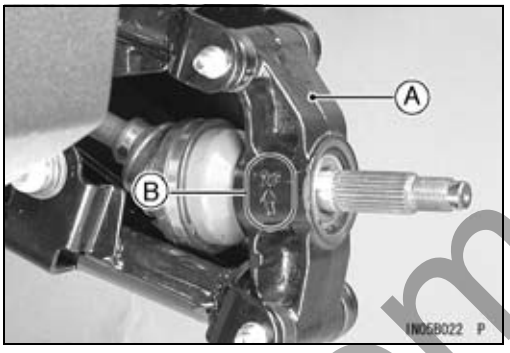
Suspension Arms

Rear Knuckle Installation

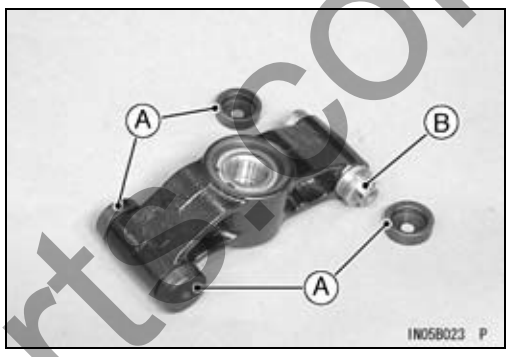
- Install the rear knuckle [A] so that the TOP mark [B] faces upward.
- Tighten:

Torque - Rear Knuckle Mounting Nuts: 57.5 N·m (5.9 kgf·m, 42 ft·lb)



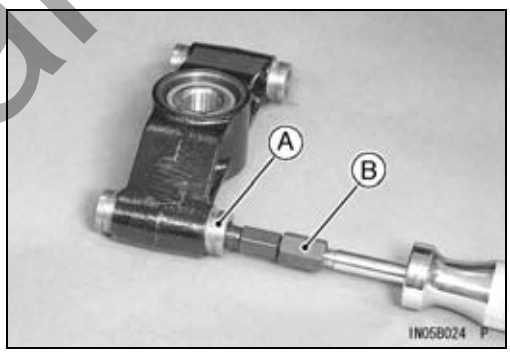
Rear Knuckle Disassembly

- Remove:
  Rear Knuckle (see Rear Knuckle Removal)
  Oil Seals [A]
  Sleeve [B]



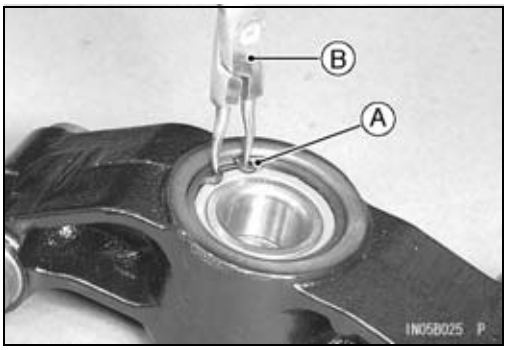
- Remove:
  Bushings [A]

○Using a suitable bearing remover [B].



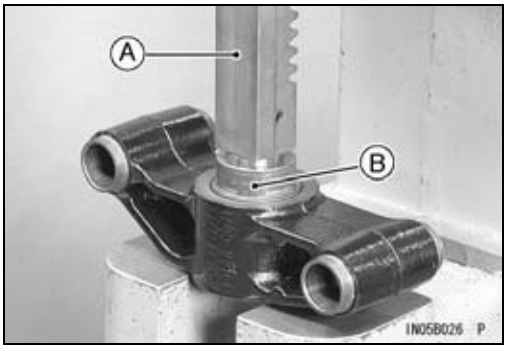
- Remove:
  Circlip [A]

Special Tool - Inside Circlip Priers [B]: 57001-143



- Remove the ball bearing using a press [A].

Special Tool - Bearing Driver Set [B]: 57001-1129



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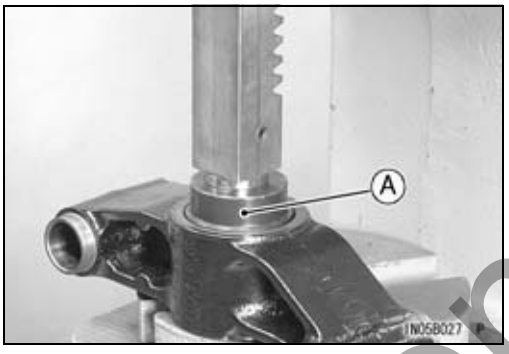
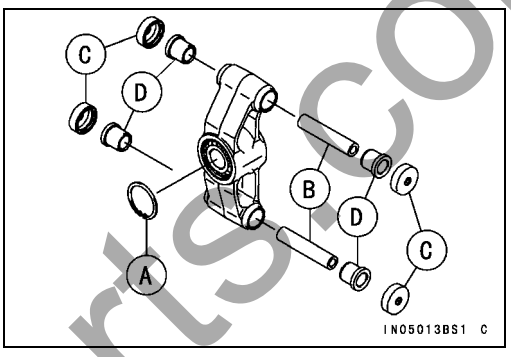
Suspension Arms

Rear Knuckle Assembly



- Install:
  Ball Bearing (until bottomed)

  Special Tool - Bearing Driver Set [A]: 57001-1129



- Install:
  New Circlip [A]

  Special Tool - Inside Circlip Priers: 57001-143
- Apply grease (Chevron Black Pearl Grease EP NLGI 2):
  Sleeves [B]
  Lips of Oil Seals [C]
- Install:
  Bushings [D] (until bottomed)

  Special Tool - Bearing Driver Set: 57001-1129
- Install:
  Sleeve
  Oil Seals

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Bearing and Oil Seal

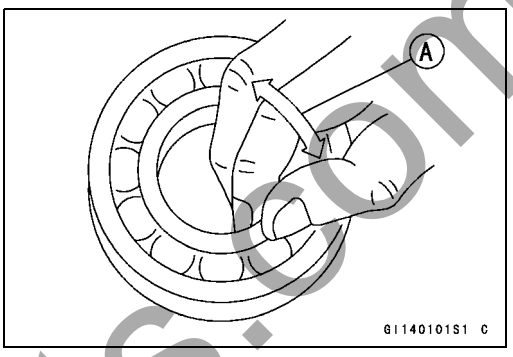
Ball Bearing Inspection

Since the bearings are made to extremely close tolerances, the clearance cannot normally be measured.

NOTICE
Do not remove any bearings for inspection.

- Turn each bearing back and forth [A] while checking for plays, roughness, or binding.

★If bearing play, roughness, or binding is found, replace the bearing.



Oil Seal Inspection

- Inspect the oil seals.

★Replace any if the lips are misshapen, discolored (indicating that the rubber has deteriorated), hardened, or been otherwise damaged.

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Steering

Table of Contents

Exploded View 14-2
Specifications 14-4
Special Tools 14-5
Steering Wheel and Main Shaft Assembly 14-6
- Steering Wheel Position Adjustment 14-6
- Steering Wheel Free Play Inspection 14-6
- Steering Wheel Centering 14-6
- Steering Wheel Removal 14-6
- Steering Wheel Installation 14-7
- Steering Shafts Removal 14-7
- Steering Shafts Installation 14-8

Steering Gear Assembly 14-9
- Steering Gear Assembly Removal 14-9
- Steering Gear Assembly Installation 14-9
- Tie-rod Length Adjustment 14-11
- Steering Joint Dust Boot Inspection 14-11

Steering Knuckles 14-12
- Steering Knuckle Removal 14-12
- Steering Knuckle Installation 14-12
- Knuckle Bearing Removal 14-13
- Knuckle Bearing Installation 14-13

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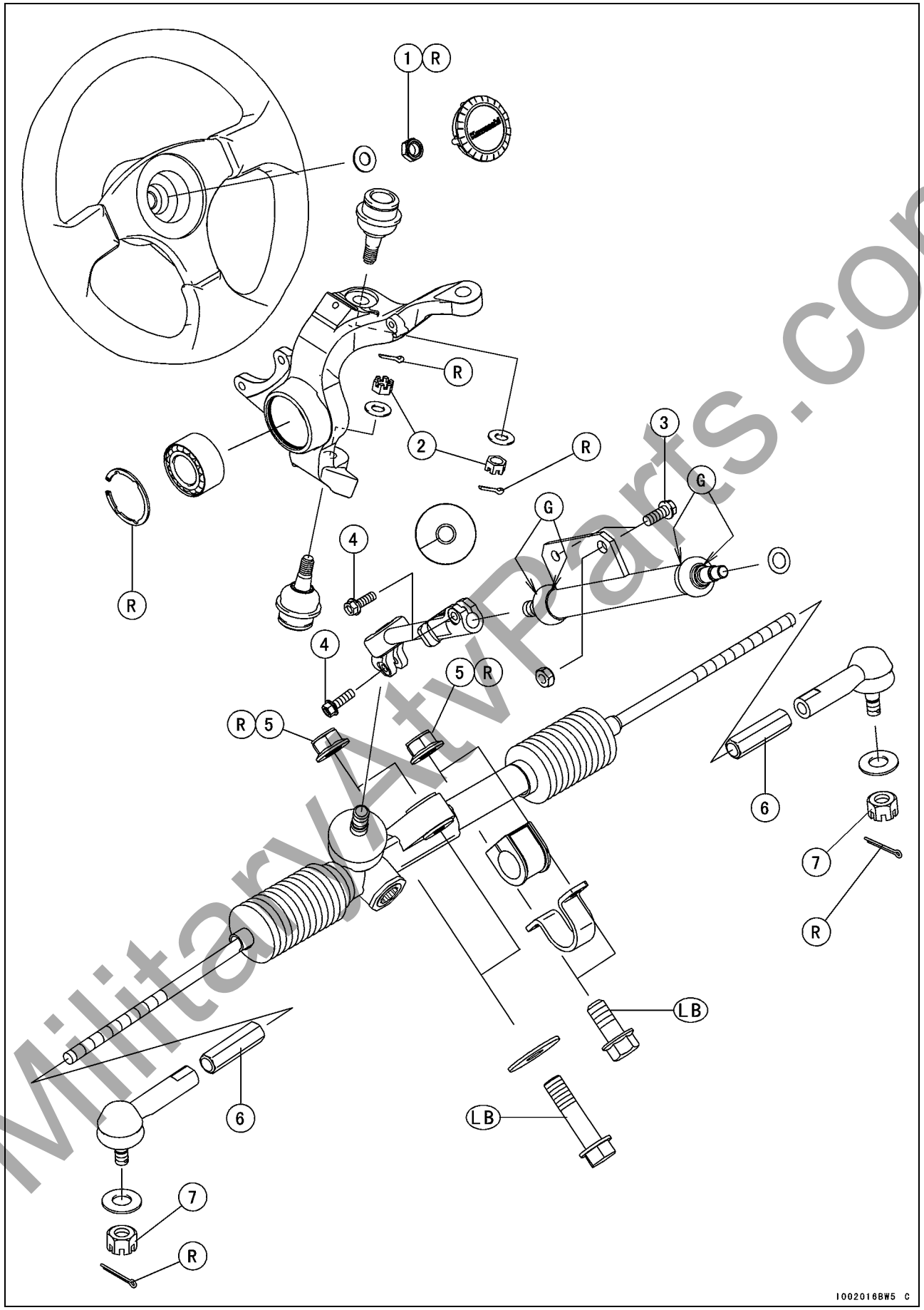
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Steering Wheel Mounting Nut	54	5.5	40	R
2	Steering Knuckle Joint Nuts	46.5	4.7	34	
3	Main Shaft Mounting Bolts	41.5	4.2	31	
4	Intermediate Shaft Clamp Bolts	21.5	2.2	16	
5	Steering Gear Assembly Nuts	95.5	9.7	70	R
6	Tie-Rod End Locknuts	44	4.5	32	
7	Tie-Rod End Nuts	41.5	4.2	31	

G: Apply grease.
LB: Apply a non-permanent locking agent (Three Bond TB2471 (Blue)).
R: Replacement Parts

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Specifications

Item	Standard	Service Limit
Steering Wheel		
Steering Wheel Free Play	0 ~ 20 mm (0 ~ 0.79 in.)	– – –
Steering Gear Assembly		
Tie-Rod Length (distance between boot end and locknut)	80 mm (3.15 in.)	– – –

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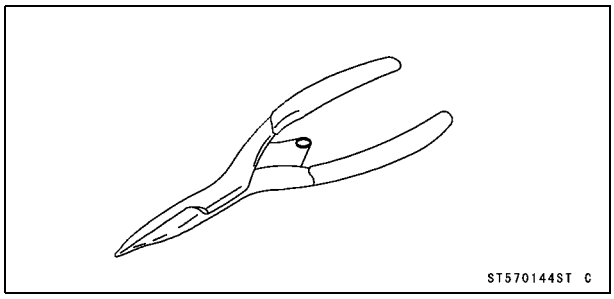
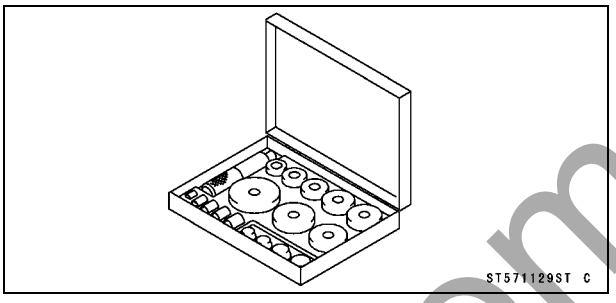
Special Tools

Outside Circlip Pliers:
57001-144



Bearing Driver Set:
57001-1129



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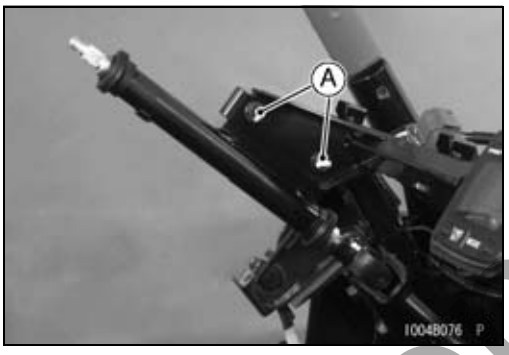
Steering Wheel and Main Shaft Assembly

Steering Wheel Position Adjustment



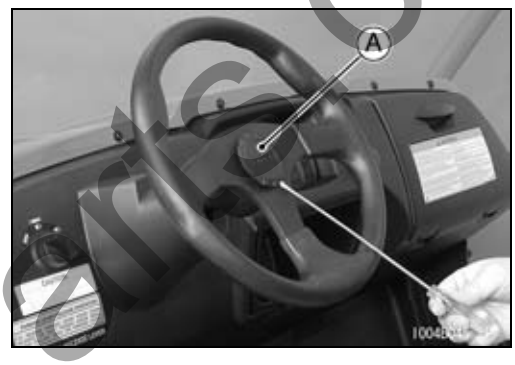
- Remove:
  Control Panel (see Control Panel Removal in the Frame chapter)
- Loosen the steering main shaft mounting bolts [A].
- Adjust the steering wheel position.
- Tighten:

Torque - Main Shaft Mounting Bolts: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

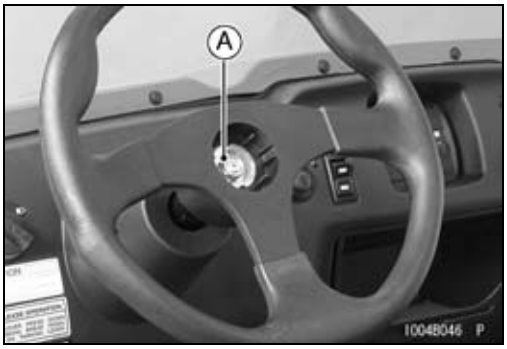
Steering Wheel Free Play Inspection

- Refer to Steering Wheel Free Play Inspection in the Periodic Maintenance chapter.

Steering Wheel Centering



- Test ride the vehicle.
★If the steering wheel is not straight when the vehicle is traveling in a straight line, do the following.
- Check the tie-rod length and adjust it if necessary (see Toe-in Adjustment in the Wheels/Tires chapter).
- Remove:
  Wheel Cap [A]

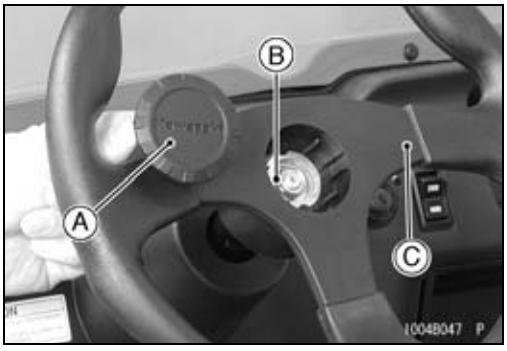


- Loosen the steering wheel mounting nut [A].
- Push the vehicle in a straight line with no one aboard, and stop it without turning the steering wheel.
- Remount the steering wheel so that it is straight ahead.
- Tighten:

Torque - Steering Wheel Mounting Nut: 54 N·m (5.5 kgf·m, 40 ft·lb)

- Install:
  Wheel Cap

Steering Wheel Removal



- Remove:
  Wheel Cap [A]
  Steering Wheel Mounting Nut [B] and Spring Washer
  Steering Wheel [C]

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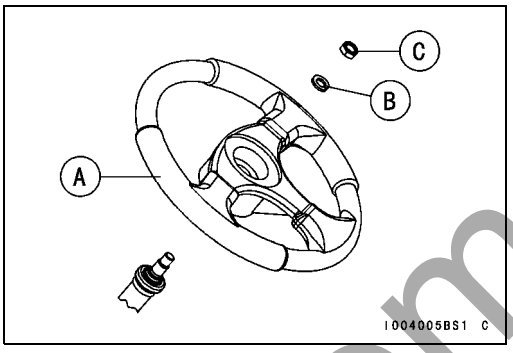
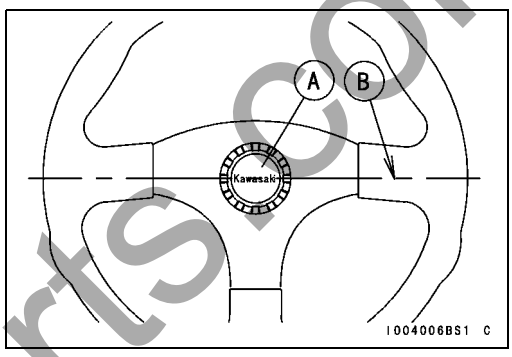
Steering Wheel and Main Shaft Assembly

Steering Wheel Installation

- Install:
  Steering Wheel [A]
  Spring Washer [B]
  New Steering Wheel Mounting Nut [C]

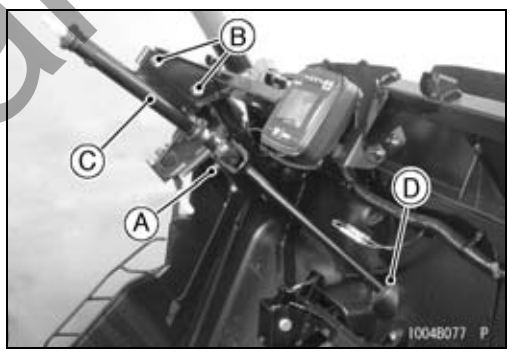


- Install the steering wheel cap [A] so that the “Kawasaki” mark parallel to the line [B].

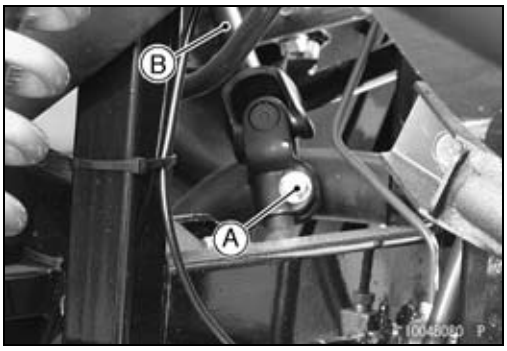


Steering Shafts Removal

- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Lift and hold the front fender rear (see Front Fender Rear Removal in the Frame chapter).
- Remove:
  Control Panel (see Control Panel Removal in the Frame chapter)
  Steering Wheel (see Steering Wheel Removal)
  Washer
  Intermediate Shaft Clamp Bolt [A]
  Main Shaft Mounting Bolts [B] and Nut
  Main Shaft [C]
  Rubber Seal [D]



- Remove:
  Intermediate Shaft Clamp Bolt [A]
  Intermediate Shaft [B]



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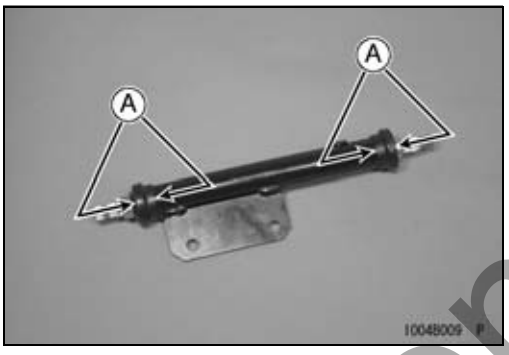
* * * MILITARY USE ONLY * * *

Steering Wheel and Main Shaft Assembly

Steering Shafts Installation

- Apply grease to the dust cover lips [A].



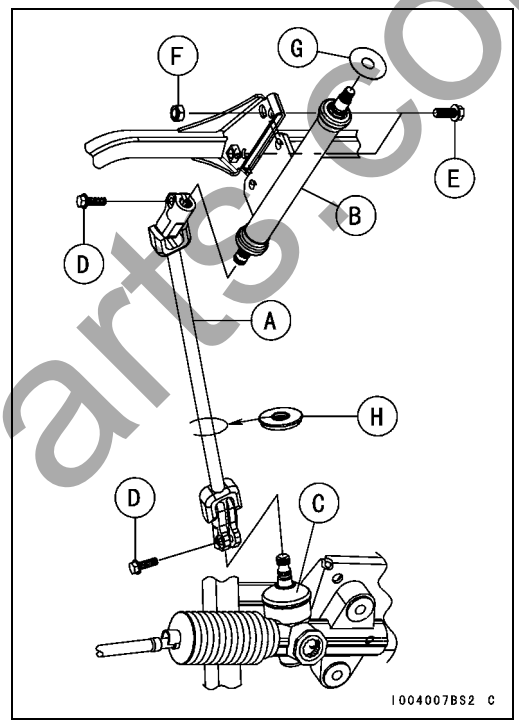
- Connect the intermediate shaft [A] to the main shaft [B] and the steering gear pinion [C] in any position.
- Tighten:

  Torque - Intermediate Shaft Clamp Bolts [D]: 21.5 N·m (2.2 kgf·m, 16 ft·lb)

- Install the main shaft mounting bolts [E] and nut [F].
- Tighten:

  Torque - Main Shaft Mounting Bolts: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

- Install the washer [G].
- Install the rubber seal [H] so that the recess side faces to front side.



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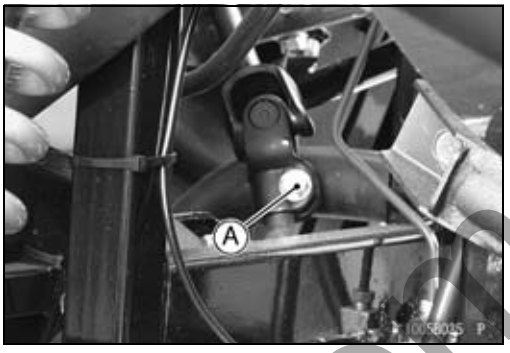
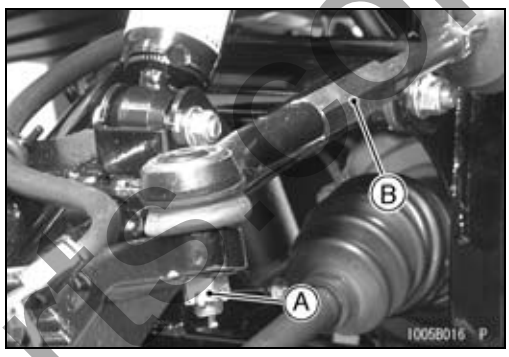
Steering Gear Assembly

Steering Gear Assembly Removal



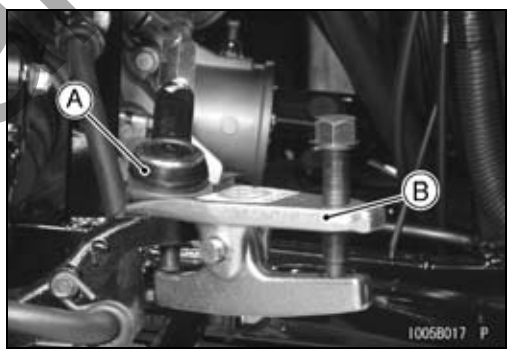
- Remove:
  Front Wheel (see Wheel Removal in the Wheel/Tires chapter)
  Intermediate Shaft Clamp Bolt [A]



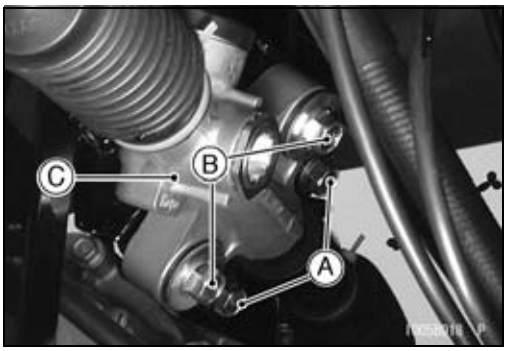
- Remove:
  Cotter Pins, Tie-rod End Nuts [A] and Washers (both sides)

NOTICE

Do not loosen the tie-rod end locknuts [B], or the toe-in of the front wheels will be changed.



- Remove the tie-rod end [A] from the knuckle using a suitable joint remover [B].



- Remove:
  Steering Gear Assembly Bracket Bolts [A]
  Steering Gear Assembly Bolts [B], Washers and Nuts
  Steering Gear Assembly [C]

Steering Gear Assembly Installation

- Adjust if necessary:
  Tie-rod Length Adjustment (see Toe-in Adjustment in the Wheels/Tires chapter)

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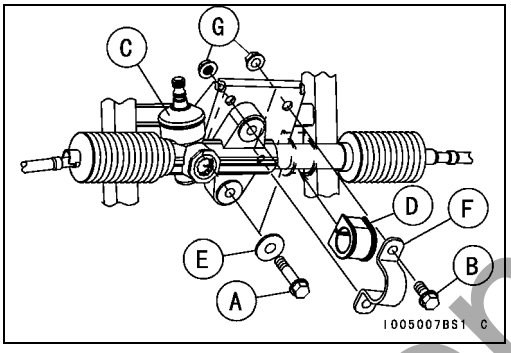
Steering Gear Assembly

- Apply a non-permanent locking agent (Three Bond TB2471 (Blue)):
  Steering Gear Assembly Bolts [A] M12, L = 60 mm (2.36 in.)
  Steering Gear Assembly Bracket Bolts [B] M12, L = 25 mm (2.36 in.)
- Install:
  Steering Gear Assembly [C]
  Damper [D]
  Washer [E] and Steering Gear Assembly Bolts
  Bracket [F] and Steering Gear Assembly Bracket Bolts
  New Steering Gear Assembly Nuts [G]
- Tighten:

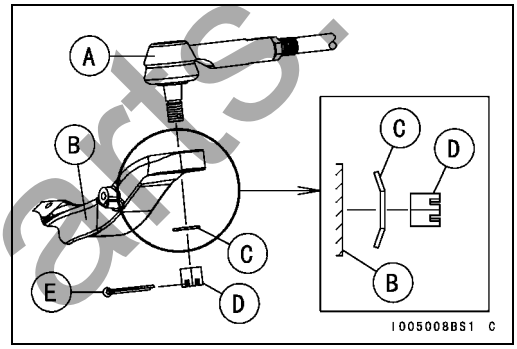
Torque - Steering Gear Assembly Nuts [G]: 95.5 N·m (9.7 kgf·m, 70 ft·lb)



- Clean the tapered portion of the tie-rod end joint [A] and the tapered hole of the steering knuckle [B], or the tapers will not fit snugly.
- Install:
  Washers [C] (both sides, as shown in the figure)
  Tie-rod End Nuts [D] (both sides)
- Tighten:

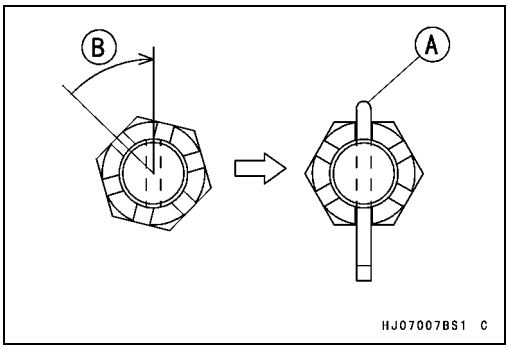
Torque - Tie-rod End Nuts: 41.5 N·m (4.2 kgf·m, 31 ft·lb)

- Install:
  New Cotter Pin [E]

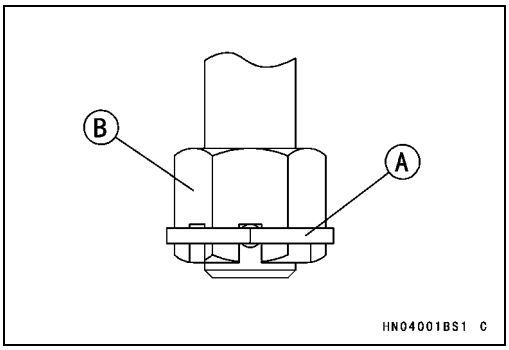


NOTE

- ○*When inserting the cotter pin [A], if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
- ○*It should be within 30 degree.*
- ○*Loosen once and tighten again when the slot goes past the nearest hole.*



- Bend the cotter pin [A] over the nut [B].



- Install the removed parts (see appropriate chapter).
- Check the toe-in of front wheels (see Toe-in Adjustment in the Wheels/Tires chapter).

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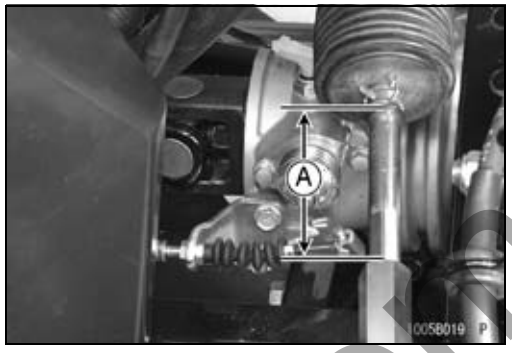
Steering Gear Assembly

Tie-rod Length Adjustment



- Refer to Toe-in Adjustment in the Wheels/Tires chapter.
  Tie-rod Length [A]

Steering Joint Dust Boot Inspection

- Refer to Steering Joint Dust Boot Inspection in the Periodic Maintenance chapter.

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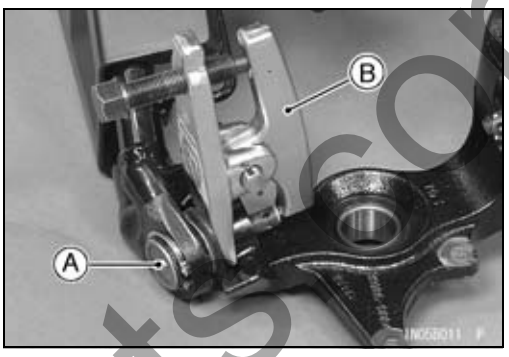
Steering Knuckles

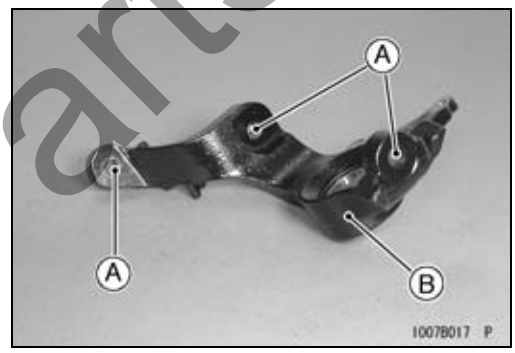
Steering Knuckle Removal

- Remove:
  Front Wheel (see Wheel Removal in the Wheel/Tires chapter)
  Front Hub (see Front Hub Removal in the Wheel/Tires chapter)
  Front Suspension Arms (see Front Suspension Arm Removal in the Suspension chapter)
- Remove the knuckle joint [A] from the suspension arm using a suitable joint remover [B].



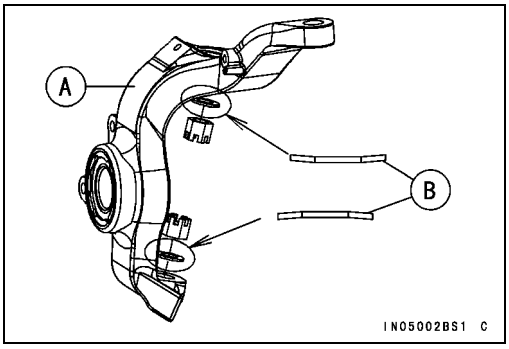
Steering Knuckle Installation

- Clean the taper surfaces [A] of the knuckle [B] and shank of the knuckle joint, or the tapers will not fit snugly.



- Install:
  Knuckle [A], Washers [B] and Nuts

○Install the washer as shown in the figure.



- Install:
  Front Suspension Arm (see Front Suspension Arm Installation in the Suspension chapter)
  Tie-rod End (see Steering Gear Assembly Installation)

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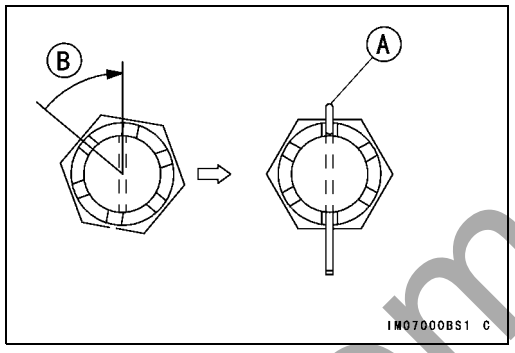
Steering Knuckles

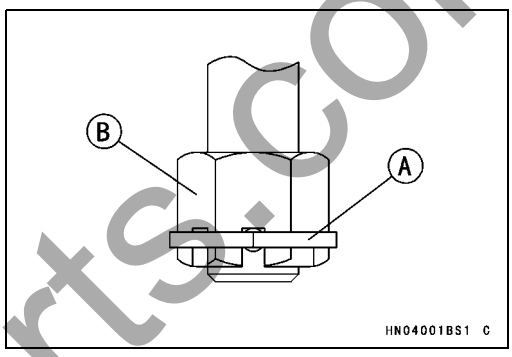
● Install:
New Cotter Pins [A]

NOTE

○*When inserting the cotter pin, if the slots in the nut do not align with the cotter pin hole in the axle, tighten the nut clockwise [B] up to next alignment.*
○*It should be within 30 degree.*
○*Loosen once and tighten again when the slot goes past the nearest hole.*



● Bend the cotter pin [A] over the nut [B].

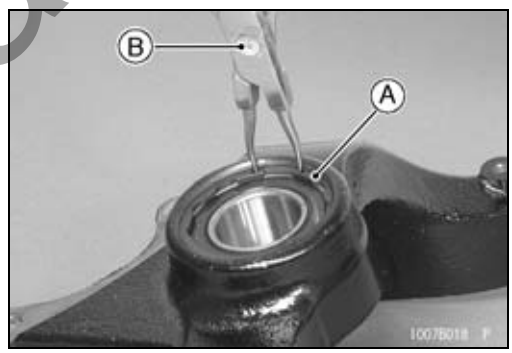


● Install the removed parts (see appropriate chapter).

Knuckle Bearing Removal

● Remove:
Knuckle (see Steering Knuckle Removal)
Circlip [A]

Special Tool - Outside Circlip Pliers [B]: 57001-144



● Drive the bearing [A] out using a suitable bearing driver.

Special Tool - Bearing Driver Set: 57001-1129

Knuckle Bearing Installation

● Press in the bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129

● Replace the circlip with a new one.

Special Tool - Outside Circlip Pliers: 57001-144

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Frame

Table of Contents

Exploded View 15-2
Seat and Seat Belts 15-16
Seat Removal 15-16
Seat Installation 15-16
Seat Disassembly 15-16
Seat Assembly 15-17
Seat Belt Removal 15-18
Seat Belt Installation 15-19
Control Panel 15-20
Control Panel Removal 15-20
Control Panel Installation 15-22
Glove Compartment Removal 15-22
Glove Compartment Installation 15-23
Cupholder Removal (KRF750P/R/S Models) 15-23
Cupholder Installation (KRF750P/R/S Models) 15-26
Fenders 15-27
Front Fender Front Removal 15-27
Front Fender Front Installation 15-27
Front Fender Rear Removal 15-27
Front Fender Rear Installation 15-28
Rear Fender Removal 15-28
Rear Fender Installation 15-29
Rear Flap Removal 15-29
Rear Flap Installation 15-29
Cargo Bed 15-30
Cargo Bed Removal 15-30
Cargo Bed Installation 15-30
Cargo Bed Disassembly 15-32
Cargo Bed Assembly 15-35
Bars 15-40
Right and Left Bars Removal 15-40
Right and Left Bars Installation 15-40
Covers 15-43
Engine Upper Cover Removal 15-43
Engine Upper Cover Installation 15-43
Center Cover Removal 15-44
Center Cover Installation 15-44
Side Cover Removal 15-44
Side Cover Installation 15-46
Seat Lower Cover Removal 15-46
Seat Lower Cover Installation 15-47
Seat Lower Right Plate Removal 15-48
Seat Lower Right Plate Installation 15-48
Seat Lower Left Plate Removal 15-48
Seat Lower Left Plate Installation 15-49
Right and Left Brackets Removal 15-49
Right and Left Brackets Installation 15-50
Center Bracket Removal 15-50
Center Bracket Installation 15-51
Right Frame Pipe Removal 15-51
Right Frame Pipe Installation 15-52
Left Cover Removal 15-52
Left Cover Installation 15-53
Windshield Removal (KRF750P/R Models) 15-54
Windshield Installation (KRF750P/R Models) 15-54
Sun Top Cover Removal (KRF750P/R Models) 15-55
Sun Top Cover Installation (KRF750P/R Models) 15-55
Guards 15-57
Front Guard Removal 15-57
Front Guard Installation 15-57
Front Bottom Guard Removal 15-57
Front Bottom Guard Installation 15-58
Middle Bottom Guard Removal 15-58
Middle Bottom Guard Installation 15-58
Engine Bottom Guard Removal 15-58
Engine Bottom Guard Installation 15-59
Rear Bottom Guard Removal 15-59
Rear Bottom Guard Installation 15-59
Floorboard 15-60
Floorboard Removal 15-60
Floorboard Installation 15-63

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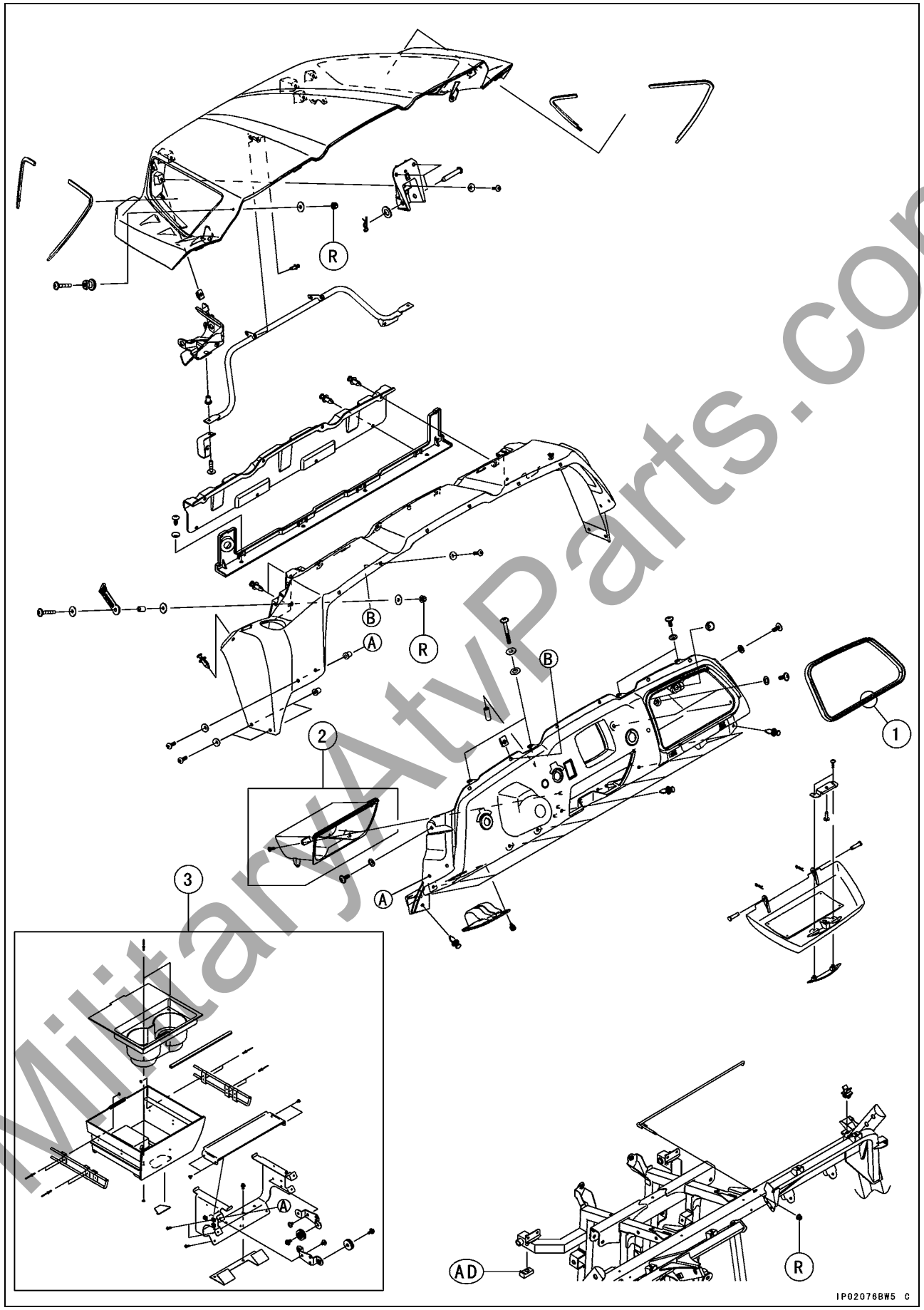
15-2 FRAME

Exploded View



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Exploded View

1. The seal ends should be at lower area and the gap is less than 3 mm (0.12 in.).
2. KRF750N/T Models
3. KRF750P/R/S Models

AD: Apply adhesive agent.
R: Replacement Parts

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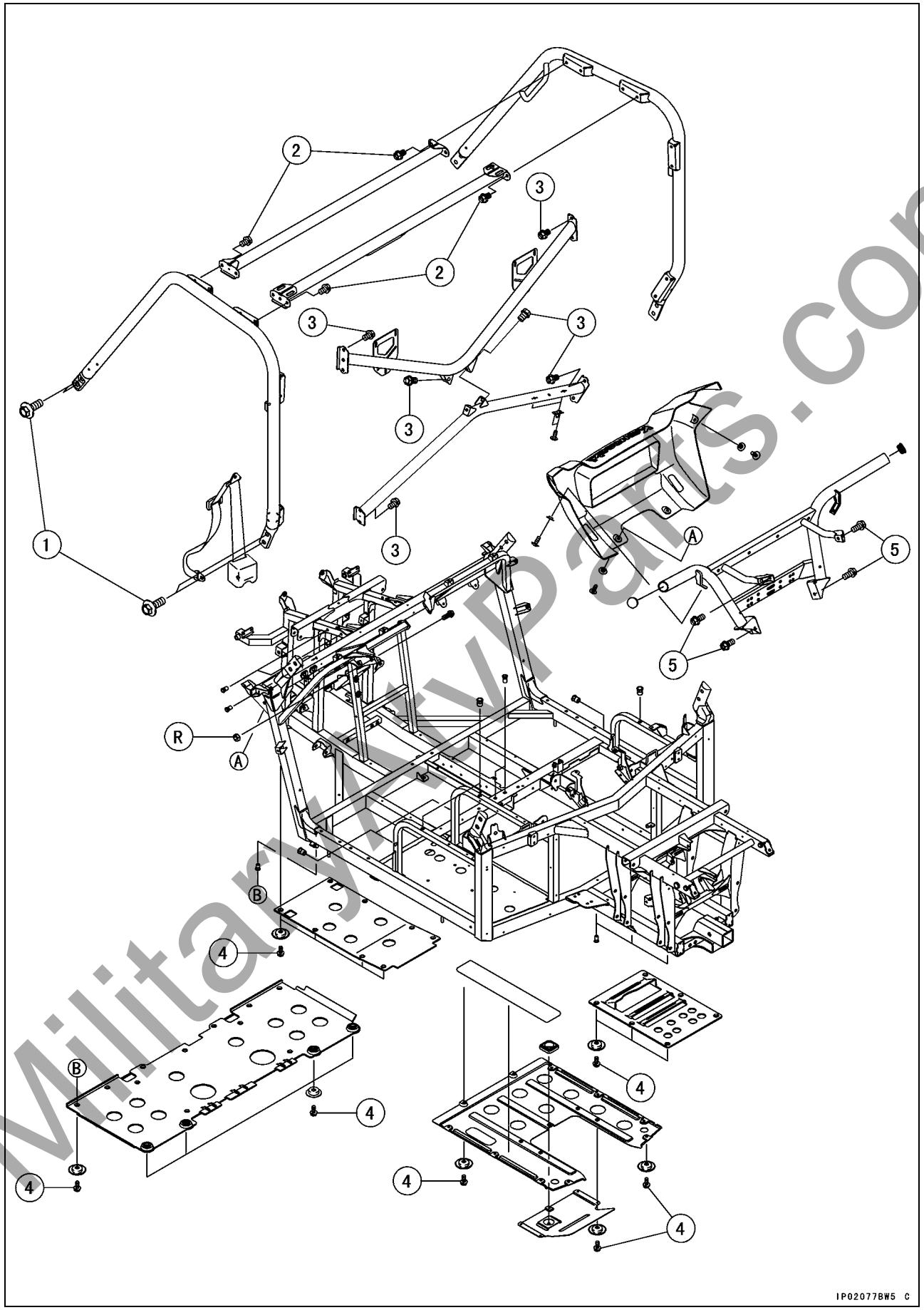
15-4 FRAME

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Right and Left Bar Mounting Bolts	98	10	72	
2	Upper Bar Mounting Bolts	46.5	4.7	34	
3	Back Bar Mounting Bolts	46.5	4.7	34	
4	Bottom Guard Bolts	8.8	0.90	78 in·lb	
5	Front Guard Bolts	31.5	3.2	23	

R: Replacement Parts

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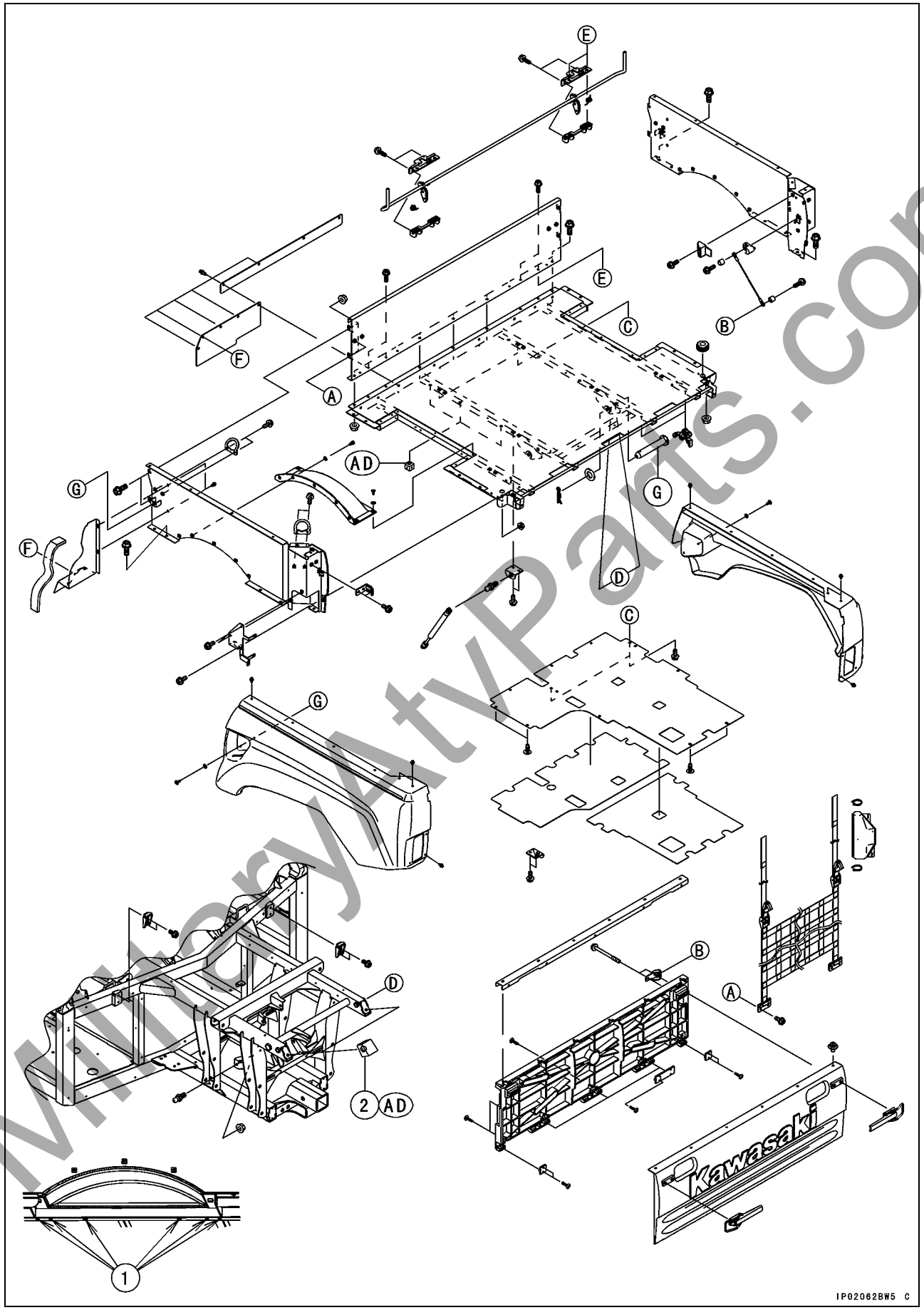
15-6 FRAME

Exploded View



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Exploded View

1. Apply sealing material to the hatched area and holes.
2. For the square dampers, install them so that the UP mark faces to upper side.

AD: Apply adhesive agent.
G: Apply grease.

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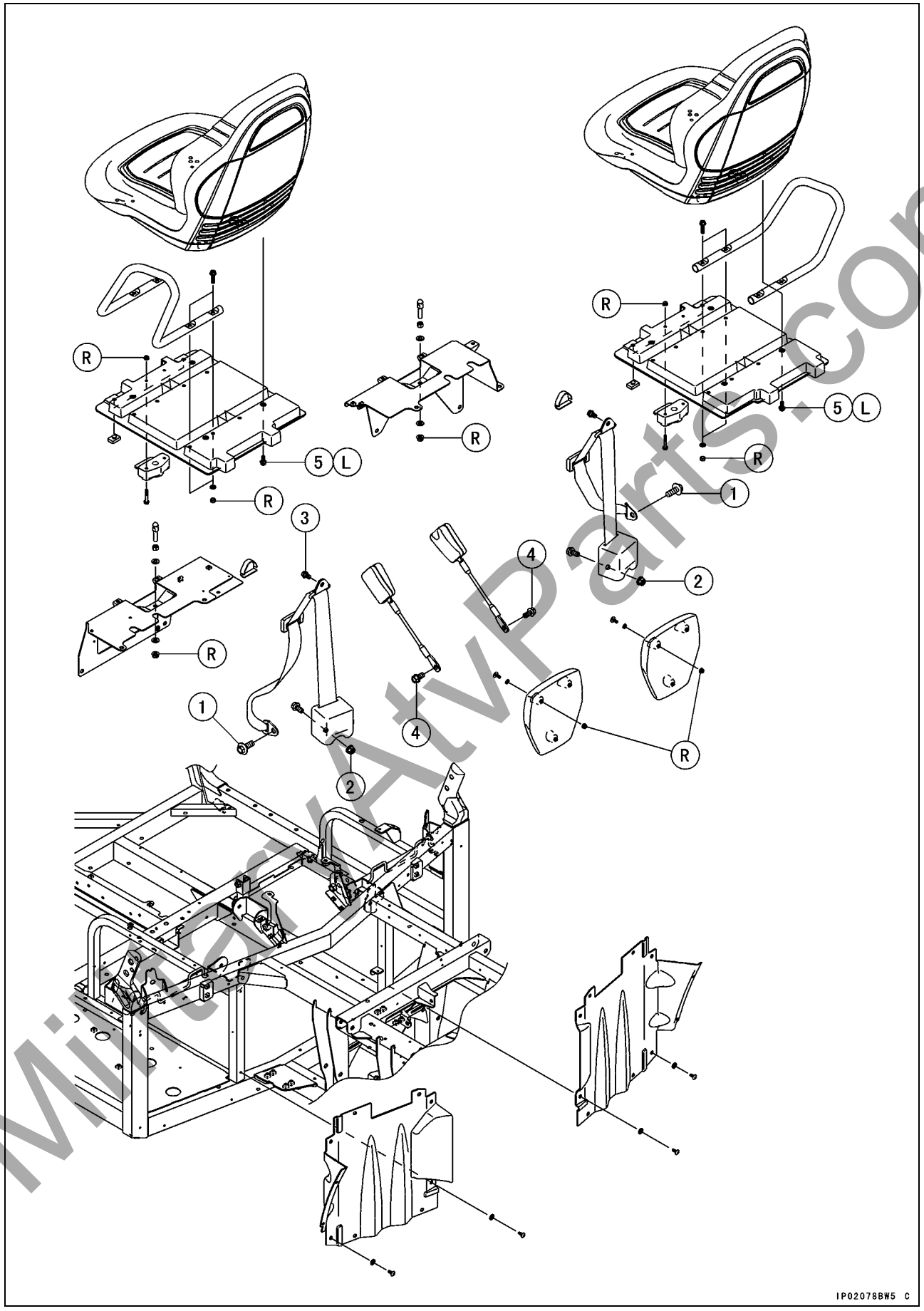
15-8 FRAME

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Right and Left Bar Mounting Bolts	98	10	72	
2	Seat Belt Case Mounting Nuts	46.5	4.7	34	
3	Seat Belt Mounting Bolts	41.5	4.2	31	
4	Seat Belt Buckle Mounting Bolts	46.5	4.7	34	
5	Seat Plate Bolts	8.8	0.90	78 in·lb	L

L: Apply a non-permanent locking agent.
R: Replacement Parts

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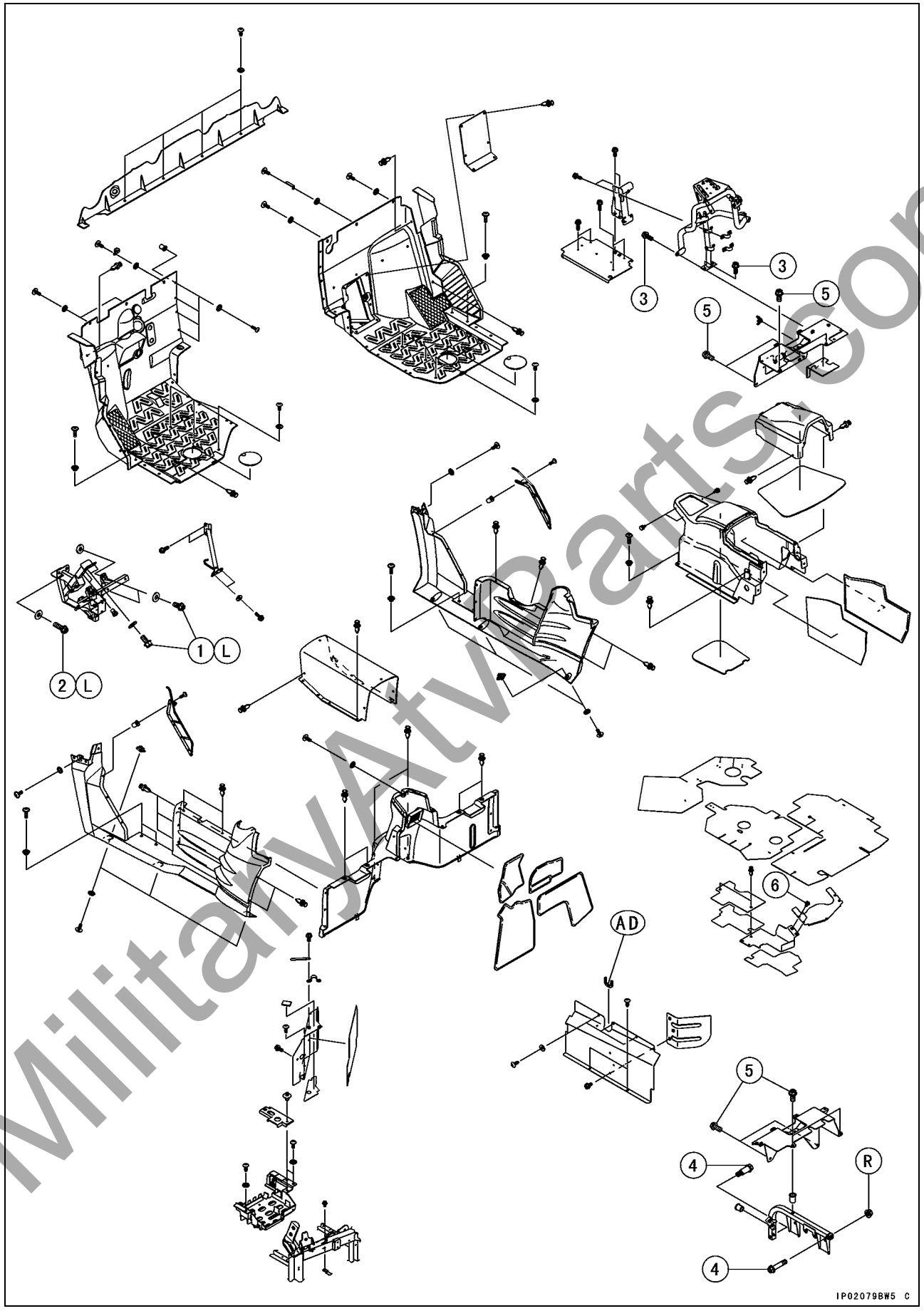
15-10 FRAME

Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Brake Pedal Bracket Mounting Bolts, L = 20 mm (0.79 in.)	34.3	3.5	25	L
2	Brake Pedal Bracket Mounting Bolts, L = 30 mm (1.2 in.)	34.3	3.5	25	
3	Center Bracket Mounting Bolts	22	2.2	16	
4	Right Frame Pipe Mounting Bolts	34.3	3.5	25	
5	Bracket Bolts	47	4.8	35	
6	Heat Guard Bolts	8.8	0.9	78 in·lb	

AD: Apply adhesive agent.
L: Apply a non-permanent locking agent.
R: Replacement Parts

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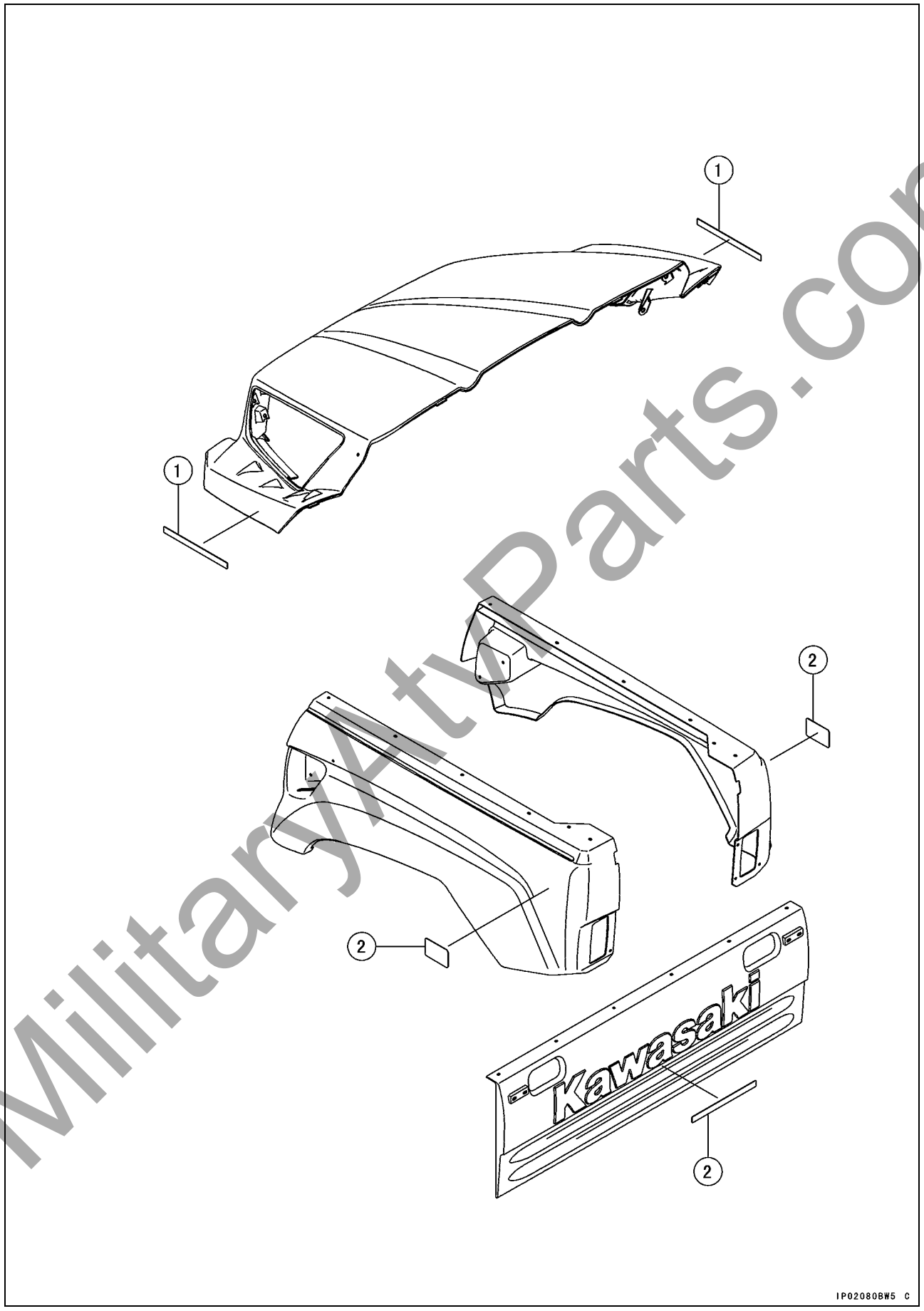
15-12 FRAME

Exploded View

Canada Model



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Exploded View

1. Reflector (Yellow)
2. Reflector (Red)

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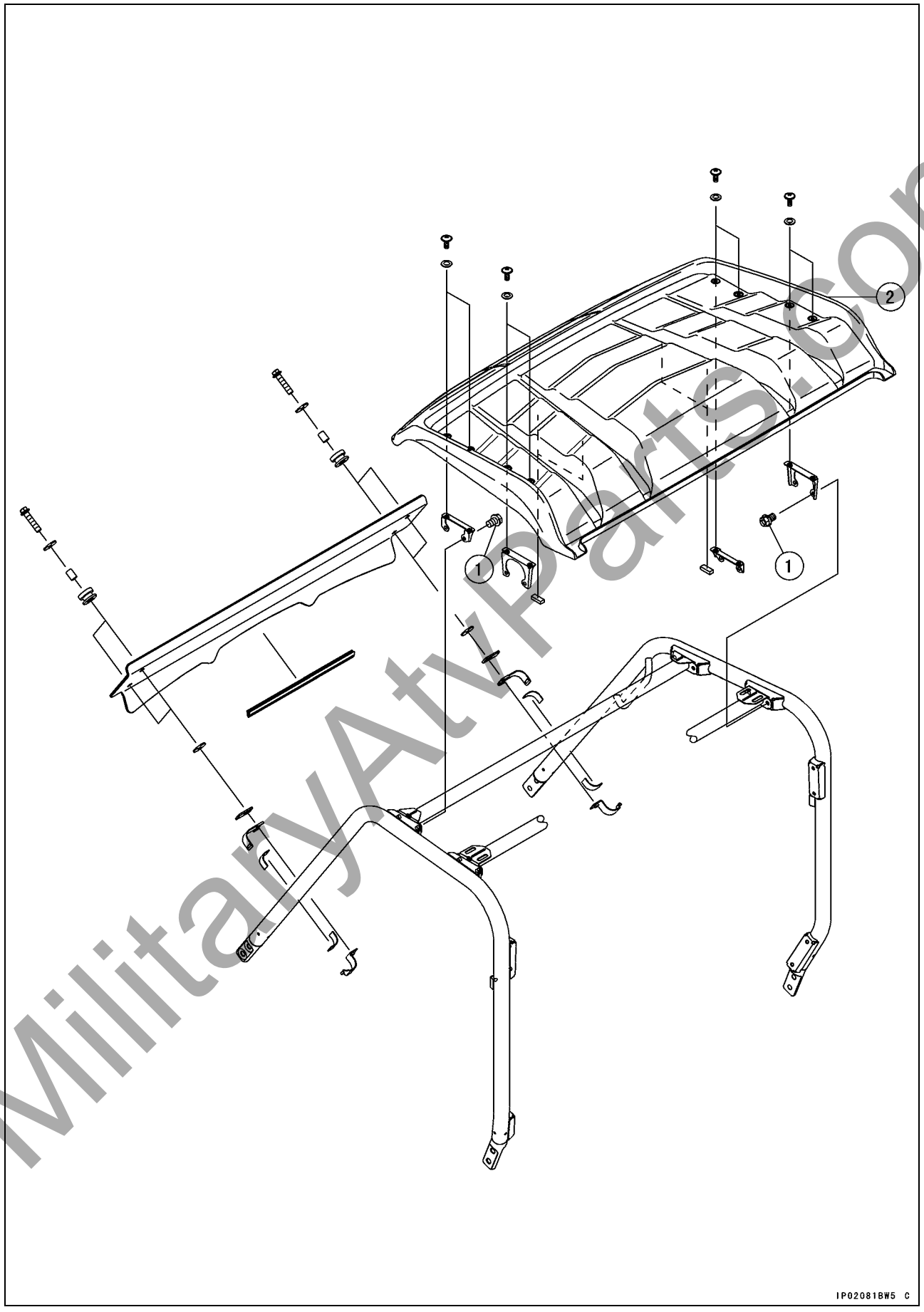
15-14 FRAME

Exploded View

KRF750P/R Models



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Upper Bar Mounting Bolts	46.5	4.7	34	

2. Sun Top Cover

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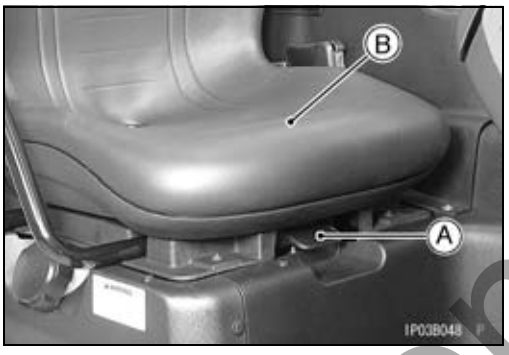
Seat and Seat Belts

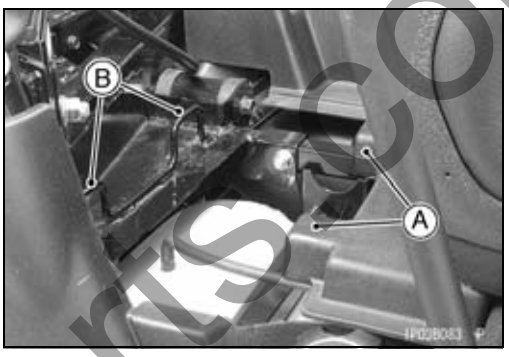
Seat Removal

- Pull the seat lock lever [A] upward.
- Lift the front edge of the seat [B], and then slide the seat forward and up.



Seat Installation

- Insert the projections [A] at the rear of the seat into the seat holders [B].

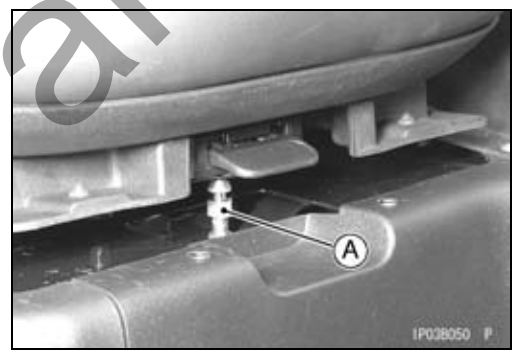


- Push down on the seat at the front and insert the pin [A] into the seat lock.

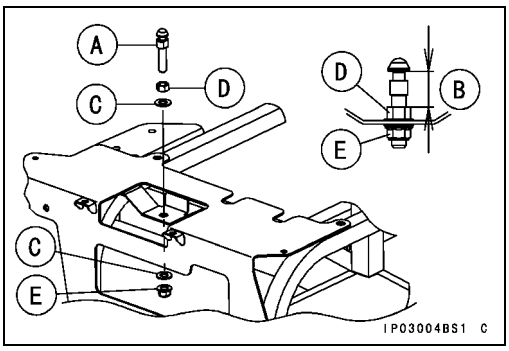
○The seat lock clicks.

⚠ WARNING

A loose seat could cause the operator to lose control or the passenger to fall out of the vehicle during operation, causing severe injury or death. Make sure the seat is securely latched before operating vehicle.

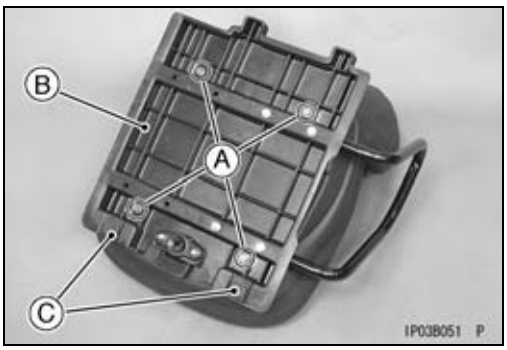


- When installing the pin [A], set the length 24.5 mm (0.965 in.) [B] as shown in the figure.
  Washers [C]
  Nut [D]
  New Self Lock Nut [E]



Seat Disassembly

- Remove:
  Seat (see Seat Removal)
  Seat Plate Bolts [A]
  Seat Plate [B]
  Dampers [C]



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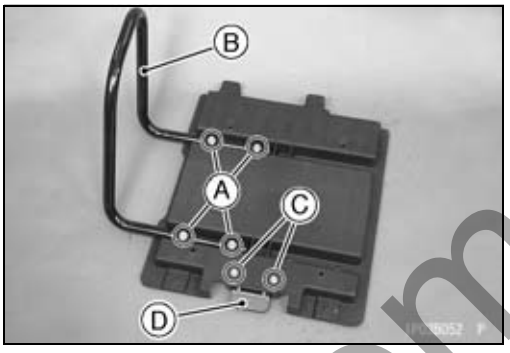
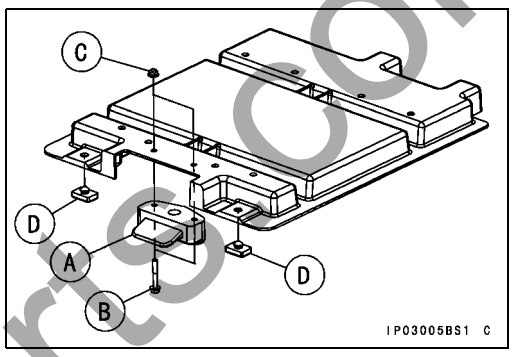
Seat and Seat Belts

● Remove:
Pipe Bolts [A], Washers and Nuts
Pipe [B]
Seat Lock Bolts and Nuts [C]
Seat Lock [D]

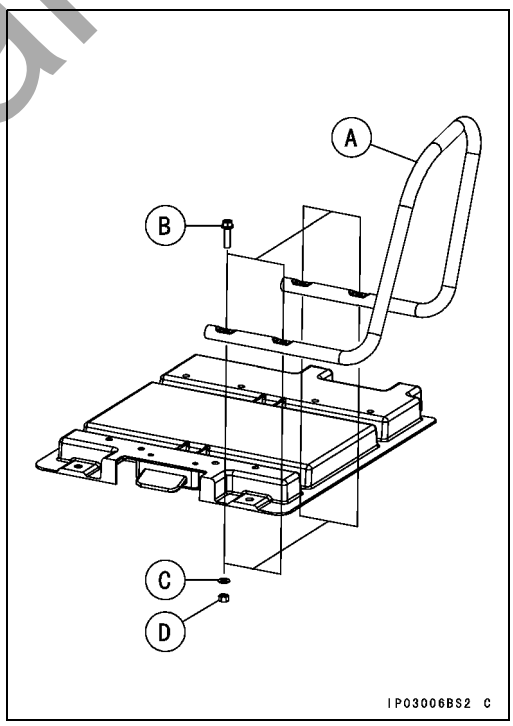


Seat Assembly

● Install:
Seat Lock [A]
Seat Lock Bolts [B] and New Nuts [C]
Dampers [D]



● Install:
Pipe [A]
Pipe Bolts [B], Washers [C] and New Nuts [D]



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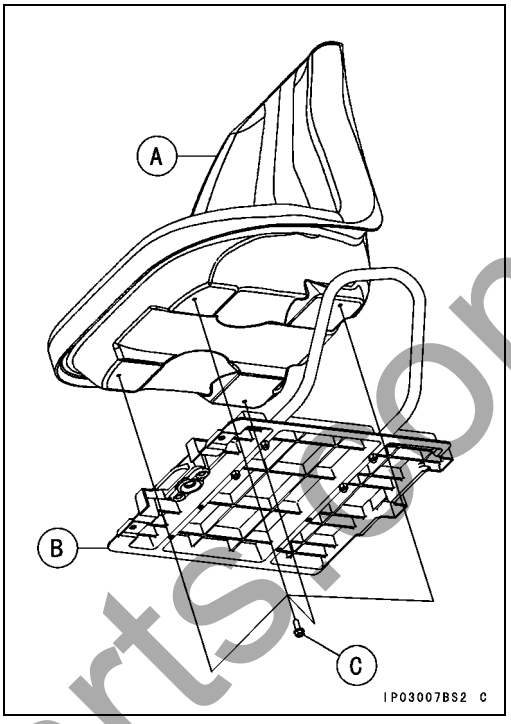
Seat and Seat Belts

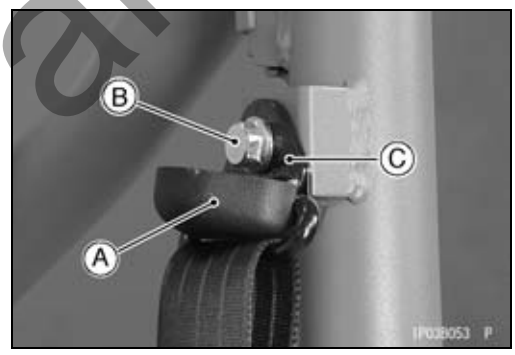
- Install:
  Seat [A]
  Seat Plate [B]
- Apply a non-permanent locking agent to the seat plate bolts [C].
- Tighten:

Torque - Seat Plate Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

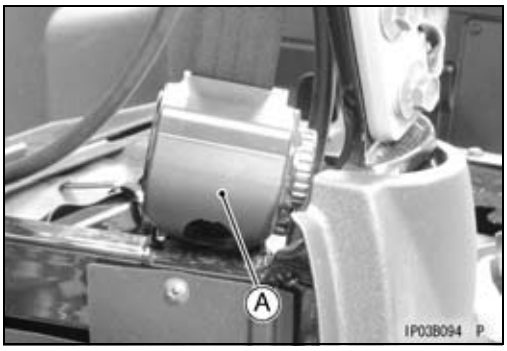


Seat Belt Removal

- Open the cover [A].
- Remove:
  Seat Belt Mounting Bolt [B]
  Upper Seat Bracket [C]



- Lift up the cargo bed.
- Remove:
  Seat (see Seat Removal)
- Open the cover [A] upward.



- Remove:
  Seat Belt Case Mounting Bolts and Nut [A]
  Seat Belt Case [B]
  Rear Bar Mounting Bolt [C]
  Lower Seat Bracket [D] and Seat Belt

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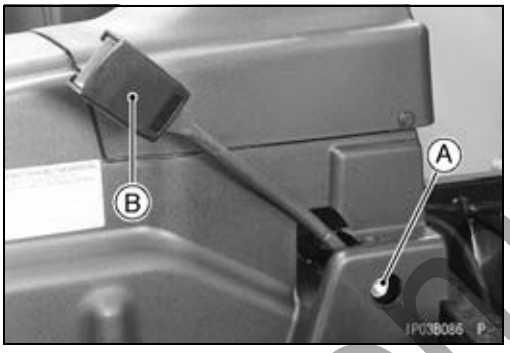
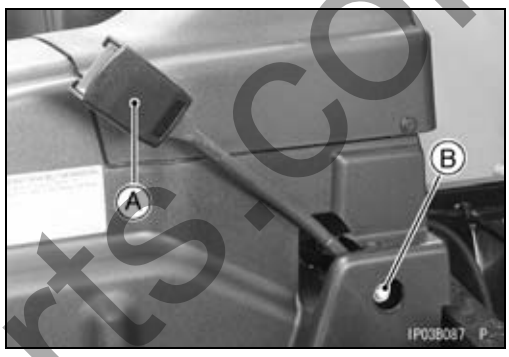
Seat and Seat Belts

● Remove:
Seat Belt Buckle Mounting Bolt [A]
Seat Belt Buckle [B]

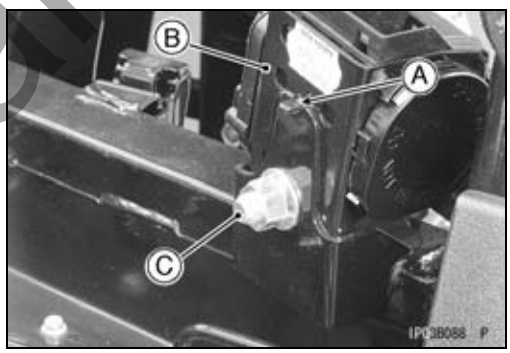


Seat Belt Installation

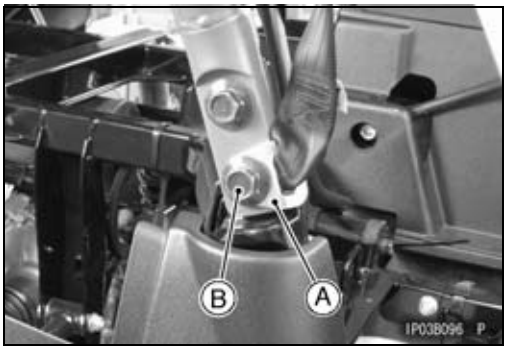
● Install:
Seat Belt Buckle [A] (as shown in the figure)
● Tighten:
Torque - Seat Belt Buckle Mounting Bolt [B]: 46.5 N·m (4.7 kgf·m, 34 ft·lb)



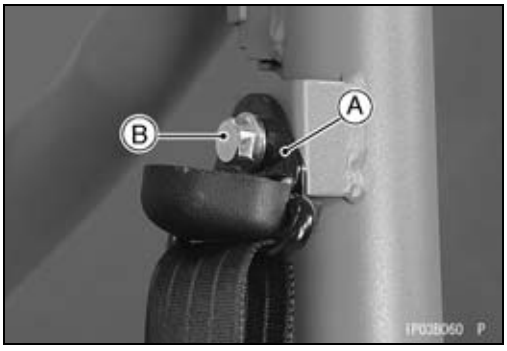
● Fit the projection [A] on the recess of the frame and install the seat belt case [B].
● Install:
Seat Belt Case Mounting Bolts [C] and Nuts
● Tighten:
Torque - Seat Belt Case Mounting Nuts: 46.5 N·m (4.7 kgf·m, 34 ft·lb)
● Fit the cover in the case securely.



● Install:
Lower Seat Bracket [A] (as shown in the figure)
Bar Mounting Bolt [B]
● Tighten:
Torque - Right and Left Bar Mounting Bolts: 98 N·m (10 kgf·m, 72 ft·lb)



● Install:
Upper Seat Bracket [A]
Seat Belt Mounting Bolt [B]
● Tighten:
Torque - Seat Belt Mounting Bolt: 41.5 N·m (4.2 kgf·m, 31 ft·lb)
● Fit the cover on the bracket securely.



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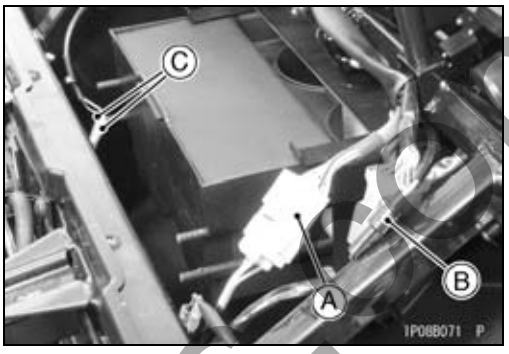
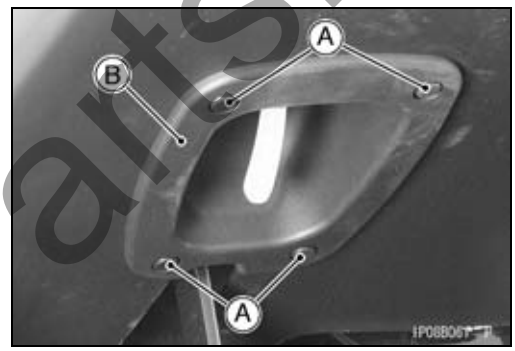
Control Panel

Control Panel Removal

- Lift and hold the front fender rear (see Front Fender Rear Removal).
- Remove:
  Steering Wheel (see Steering Wheel Removal in the Steering chapter)
- Disconnect:
  Ignition Switch Lead Connector [A]
  2WD/4WD Shift Switch Lead Connector [B]
  Power Outlet Connector Lead Connectors [C]

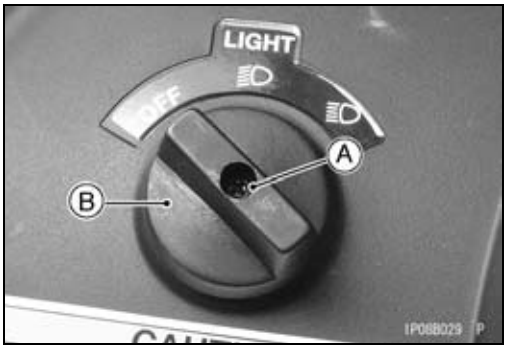


- Remove:
  Quick Rivets [A]
  Cover [B]



- Remove:
  Plug [A]

- Remove:
  Screw [A]
  Knob [B]



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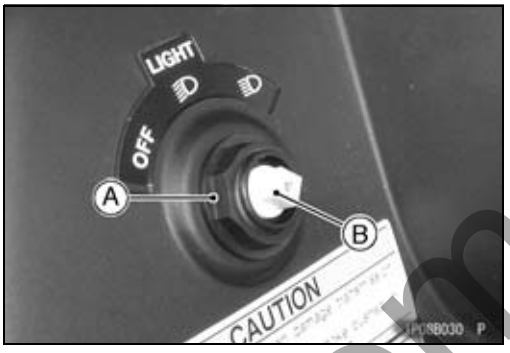
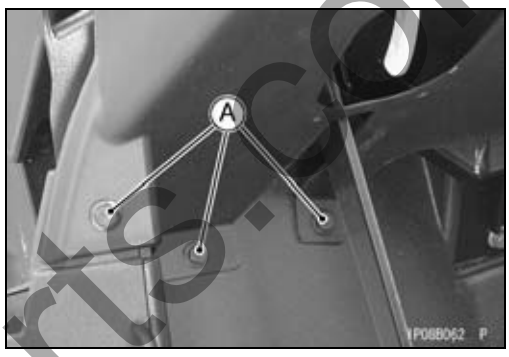
Control Panel

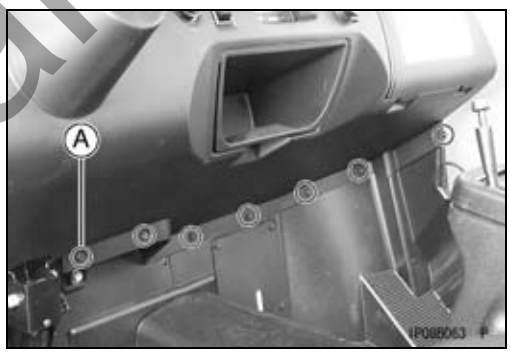
- Remove:
  Mounting Nut [A]
  Light Switch [B]



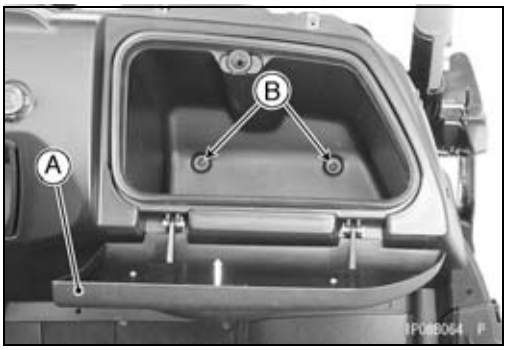
- Remove:
  Quick Rivets [A]



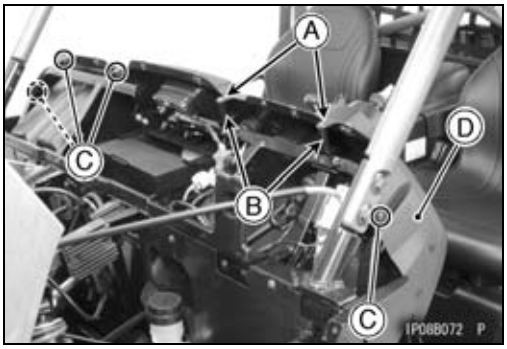
- Remove:
  Quick Rivets [A]



- Open the cover [A].
- Remove:
  Screws [B] and Collars



- Remove:
  Screws [A], Washers and Collars [B]
  Screws [C] and Collars
  Control Panel [D]



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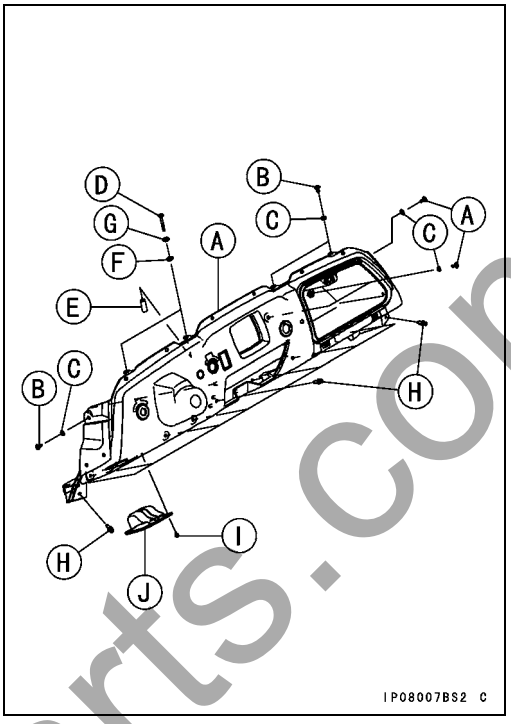
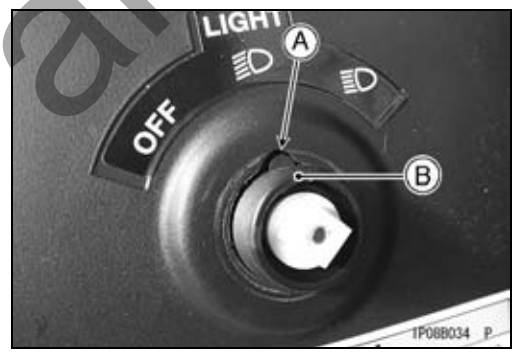
Control Panel

Control Panel Installation



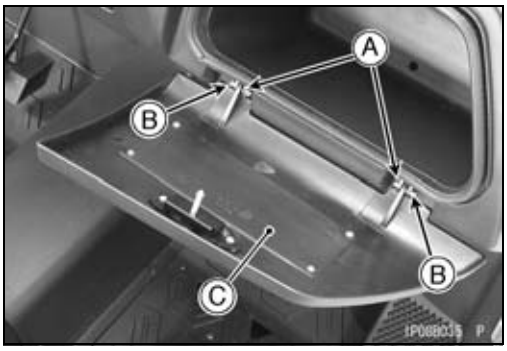
- Install:
  Control Panel [A]
  Screws [B] L = 16 mm (0.63 in.)
  Collars [C] L = 4 mm (0.16 in.)
  Screws [D] L = 56 mm (2.20 in.)
  Collars [E] L = 40 mm (1.57 in.)
  Washers [F]
  Collars [G] L = 4.7 mm (0.19 in.)
  Quick Rivets [H]
  Quick Rivets [I]
  Cover [J]



- Fit the projection [A] on the light switch [B] into the recess in the control panel.
- Install:
  Mounting Nut
  Screw
  Knob
  Plug
- Install removed parts.

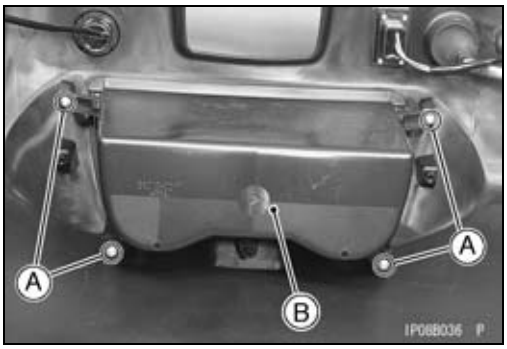
Glove Compartment Removal

Right Glove Compartment Cover



- Remove:
  Clips [A]
  Pins [B]
  Right Glove Compartment Cover [C]

Center Glove Compartment (KRF750N/T Models)



- Remove:
  Control Panel (see Control Panel Removal)
  Screws [A]
  Center Glove Compartment [B]

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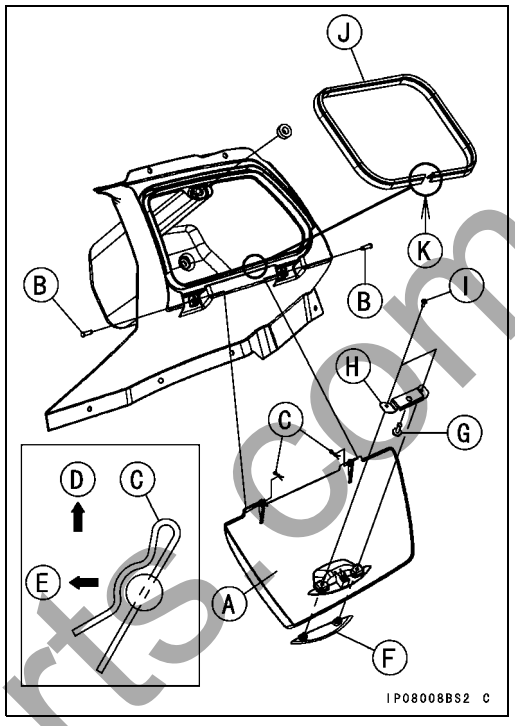
Control Panel

Glove Compartment Installation

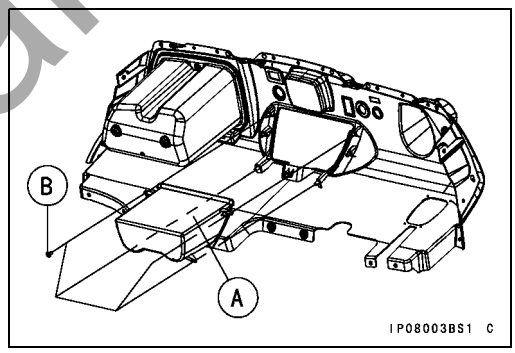
Right Glove Compartment Cover

- Install:
  Right Glove Compartment Cover [A]
  Pins [B]
- Install the clips [C] as shown in the figure.
  Up [D]
  Forward [E]
- When installing the cover [F], install the following parts.
  Pin [G] and Bracket [H]
  Screws [I]
- When installing the trim seal [J], the seal ends [K] should be at lower area and the gap is less than 3 mm (0.12 in.).



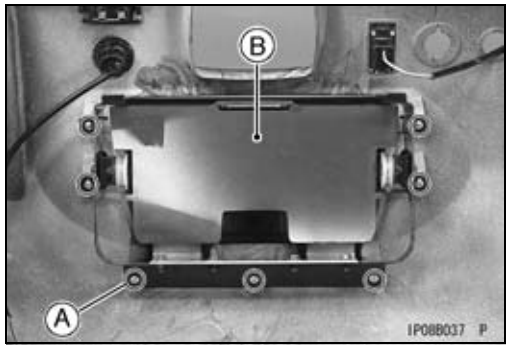
Center Glove Compartment (KRF750N/T Models)

- Install:
  Center Glove Compartment [A]
  Screws [B]

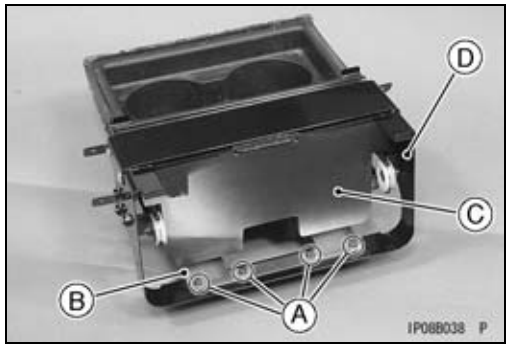


Cupholder Removal (KRF750P/R/S Models)

- Remove:
  Control Panel (see Control Panel Removal)
  Tapping Screws [A]
  Cupholder Assembly [B]



- Remove:
  Bolts [A]
  Holder [B]
- Pull out the cupholder case [C] from the cupholder bracket [D].



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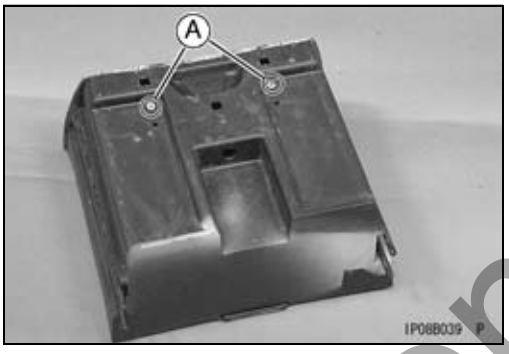
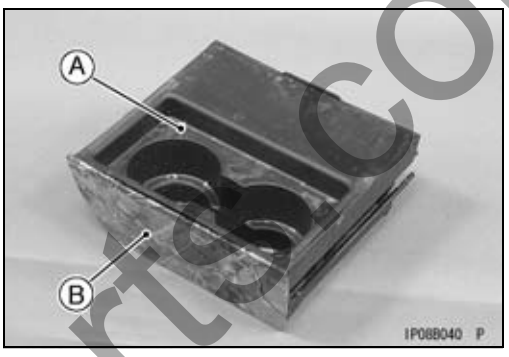
Control Panel

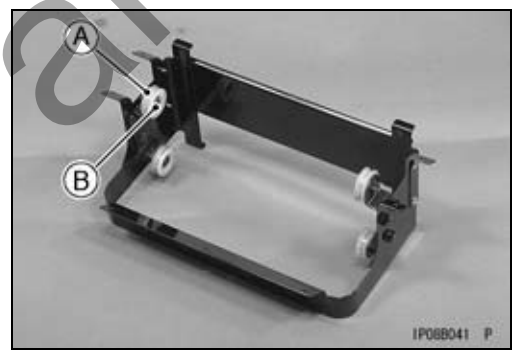
● Remove:
Rivets [A]
○Drill the rivets and remove them.



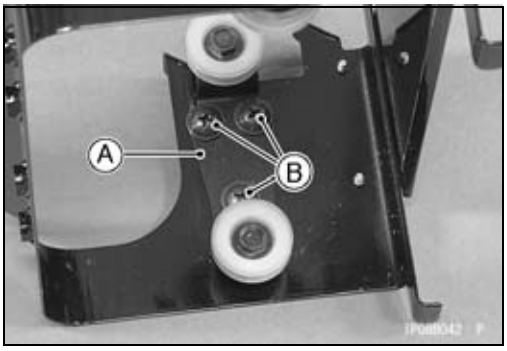
● Remove the cupholder [A] from the cupholder case [B].



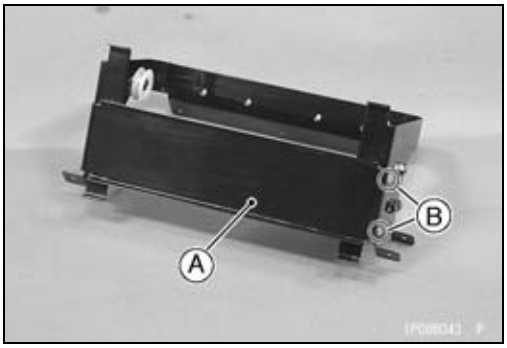
● When removing the roller [A], remove the bolt [B].



● When removing the roller bracket [A], remove the screws [B].



● When removing the plate [A], remove the tapping screws [B] (both sides).



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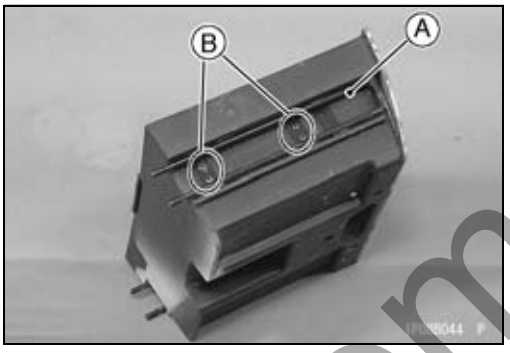
Control Panel

● When removing the guide [A], remove the rivets [B].
○Drill the rivets and remove them.



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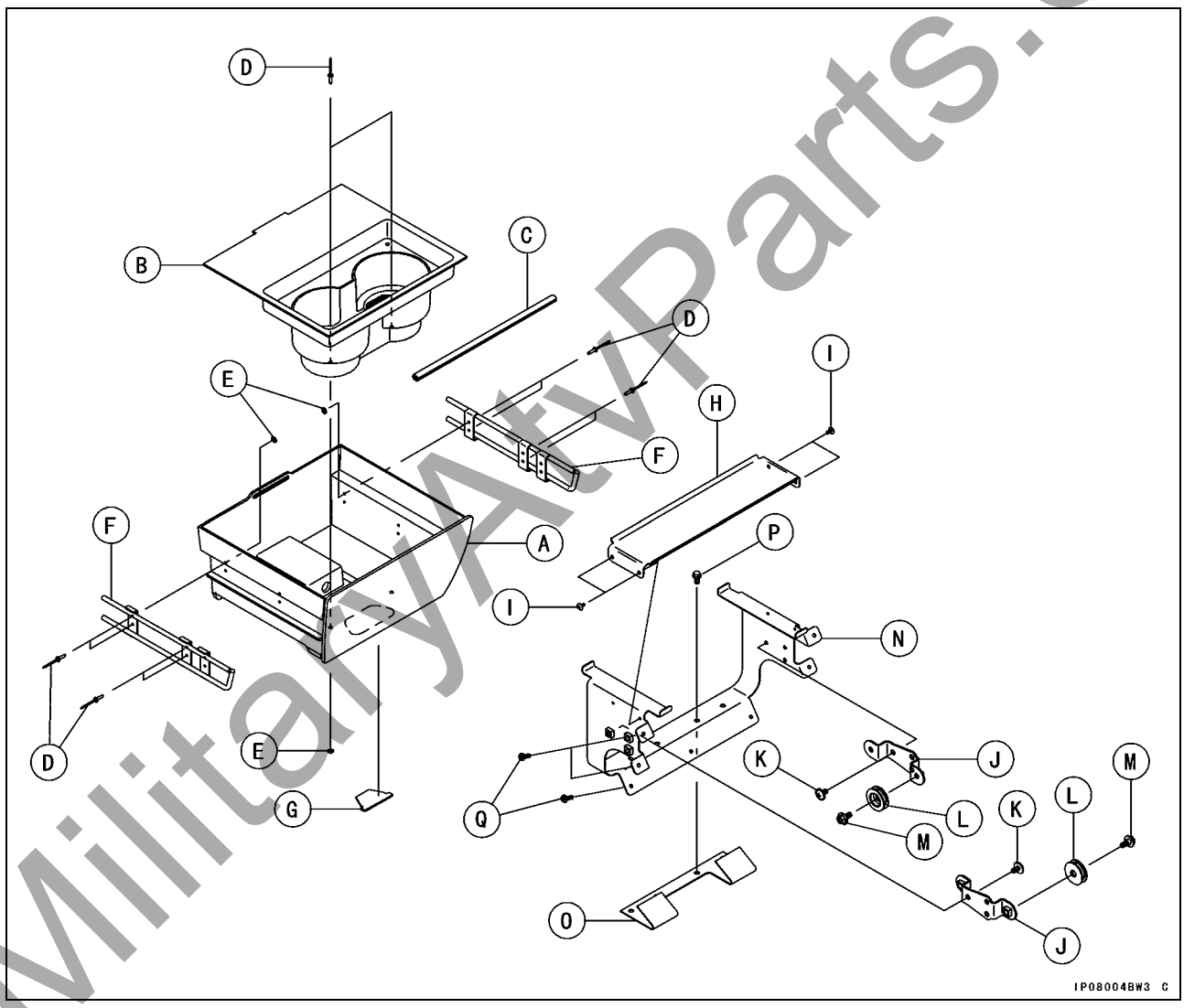
Control Panel

Cupholder Installation (KRF750P/R/S Models)

- Install:
  Cupholder Case [A]
  Cupholder [B]
  Trim [C]
  Rivets [D]
  Washers [E]
  Guides [F]
  Damper [G]
  Plate [H]
  Tapping Screws [I], L = 8 mm (0.31 in.)
  Roller Brackets [J]
  Screws [K]
  Rollers [L]
  Bolts [M], L = 13 mm (0.51 in.)



- Install the cupholder case to the cupholder bracket [N].
- Install:
  Holder [O]
  Bolts [P], L = 10 mm (0.39 in.)
- Install the cupholder assembly to the control panel.
- Tighten the tapping screws [Q] (both sides), L = 12 mm (0.47 in.).

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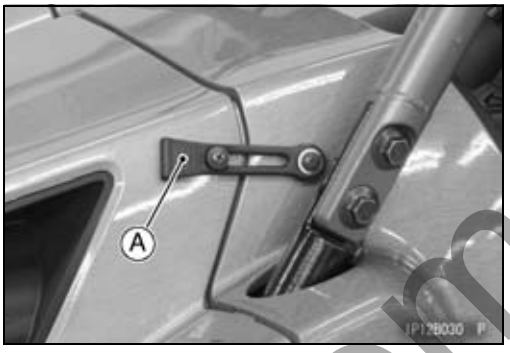
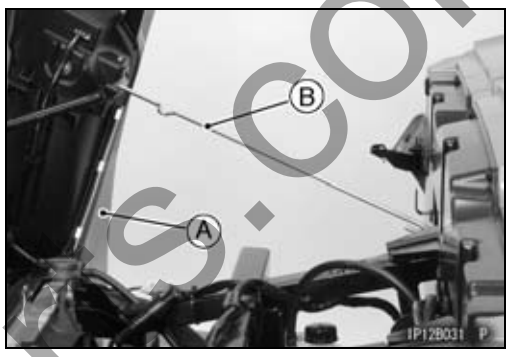
Fenders

Front Fender Front Removal

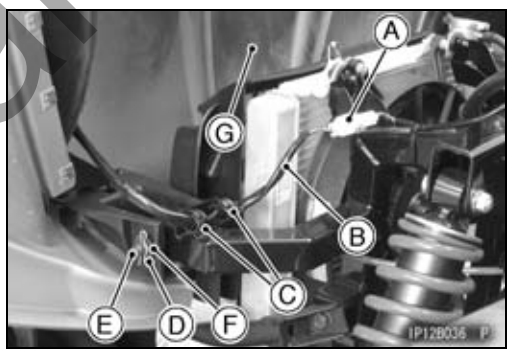
- Remove:
  Band [A] (both sides)



- Clear the four hook portions from the slots, lift up the front fender front [A].
- Support it in the tilted position with the supporting rod [B].

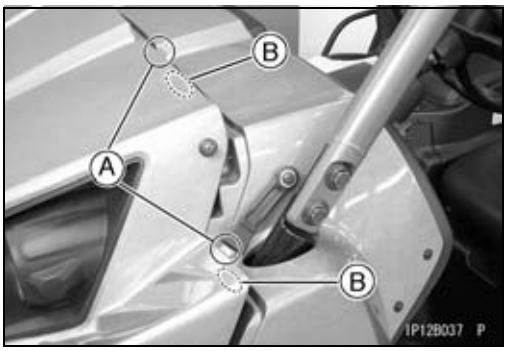


- Disconnect:
  Headlight Lead Connector [A] (both sides)
- Remove the harness [B] from the clamps [C] (both sides)
- Remove:
  Snap Pin [D] (both sides)
  Front Fender Front Mounting Pin [E] and Washer [F] (both sides)
  Front Fender Front [G]



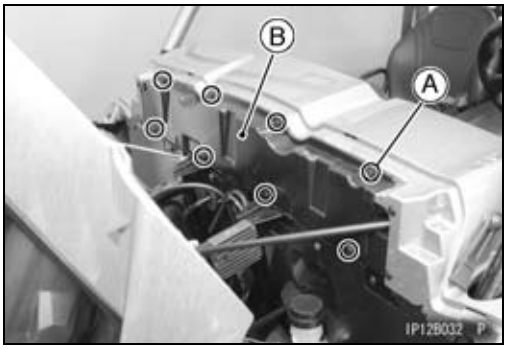
Front Fender Front Installation

- Installation is the reverse of removal.
- Insert the front fender front hooks [A] into the receivers [B] in the front fender rear (both sides).



Front Fender Rear Removal

- Remove:
  Tilt up and hold the front fender front (see Front Fender Front Removal).
  Quick Rivets [A]
  Cover [B]



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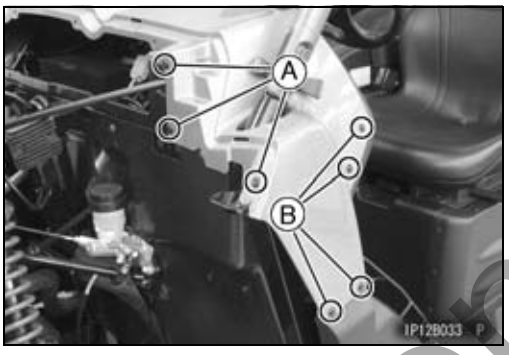
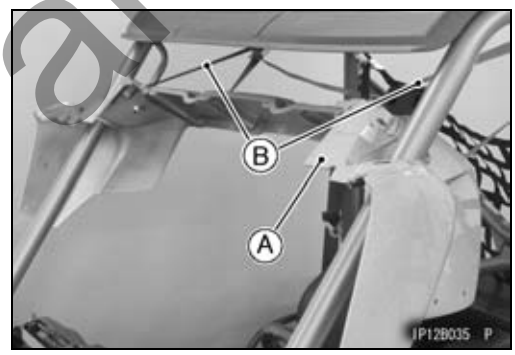
Fenders

- Remove:
  Quick Rivets [A] (both sides)
  Screws [B] (both sides)



- Remove:
  Screws [A] and Collars

- When holding the front fender rear [A] at upper position, lift and hold it with a suitable belt [B] firmly.



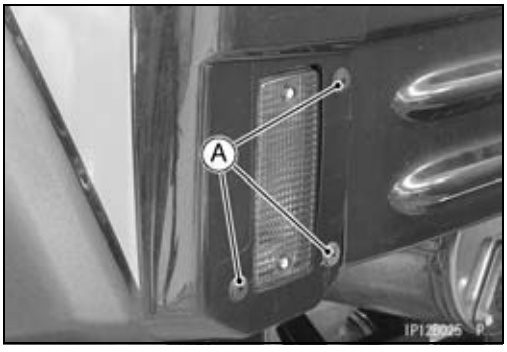
- When removing the front fender rear from the frame, remove the right and left bar (see Right and Left Bars Removal).
- Remove the front fender rear.

Front Fender Rear Installation

- Installation is the reverse of removal.

Rear Fender Removal

- Remove:
  Screw Rivets [A]



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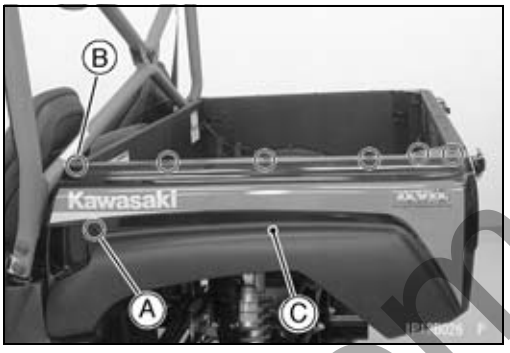
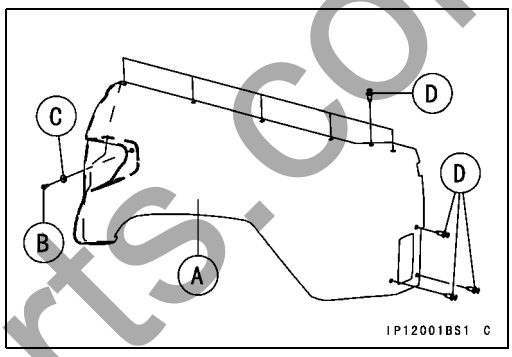
Fenders

● Remove:
Screw [A] and Collar
Screw Rivets [B]
Rear Fender [C]



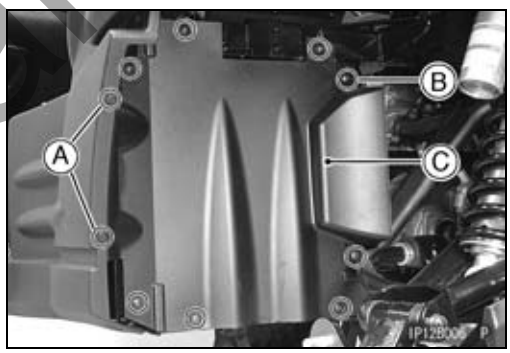
Rear Fender Installation

● Install:
Rear Fender [A]
Screw [B] and Collar [C]
Screw Rivets [D]



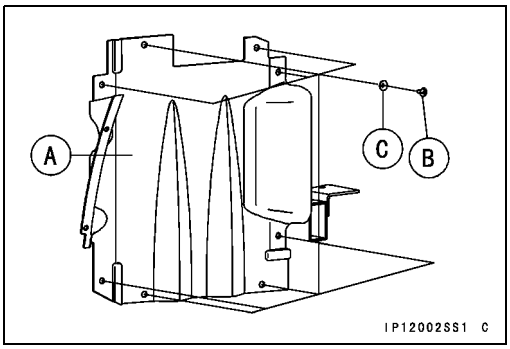
Rear Flap Removal

● Remove:
Rear Wheel (see Wheel Removal in the Wheels/Tires chapter)
Quick Rivets [A]
Tapping Screws [B] and Collars
Rear Flap [C]

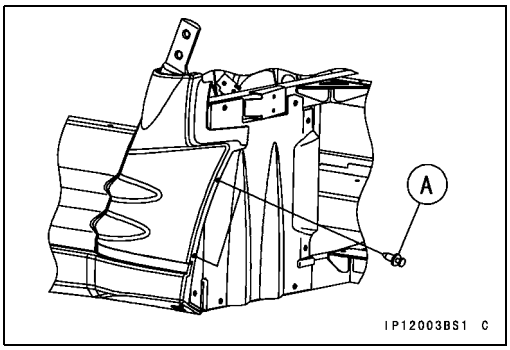


Rear Flap Installation

● Install:
Rear Flap [A]
Tapping Screws [B] and Collars [C]



● Install:
Quick Rivets [A]
Rear Wheel (see Wheel Installation in the Wheels/Tires chapter)



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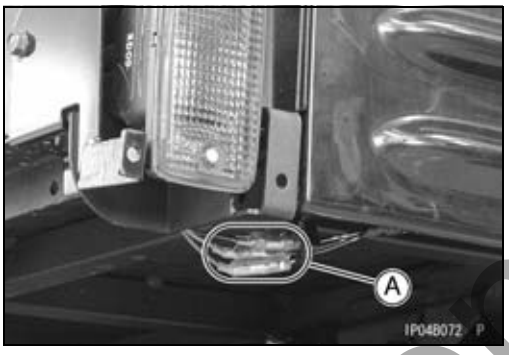
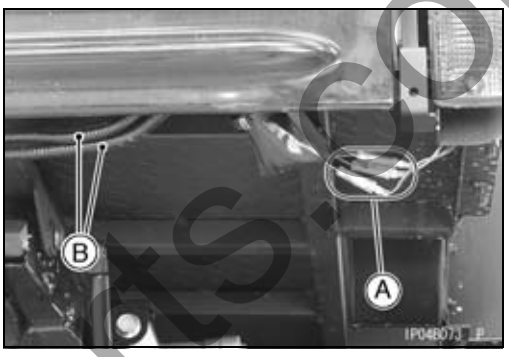
Cargo Bed

Cargo Bed Removal

- Remove:
  Rear Fenders (see Rear Fender Removal)
  Tail/Brake Light Lead Connectors [A]

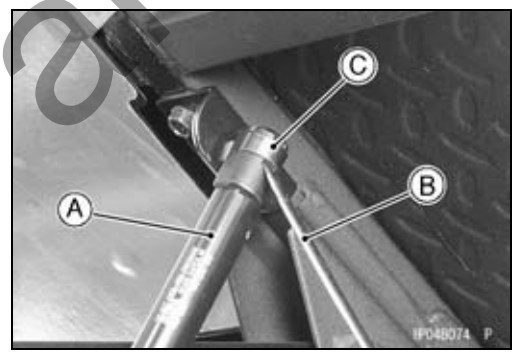


- Remove:
  Tail/Brake Light Lead Connectors [A]
- Remove the harness [B] from the clamps.

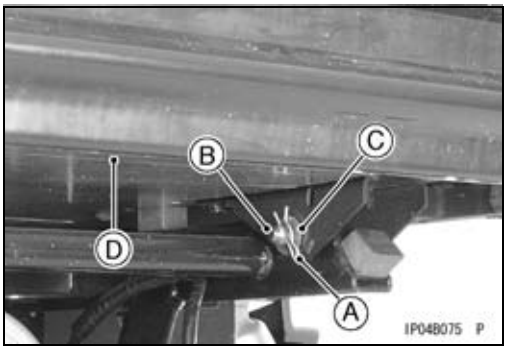


- Remove the gas spring dampers [A] following procedure as follows.

○Lift up the cargo bed.
○Insert the standard tip screwdriver [B] between the clamp [C] and recess, and pry the clamp.
○Lift up stronger and hold the cargo bed at full position.
○Remove the gas spring damper from the stud.
○Repeat the same procedure for other side and remove the gas spring damper.

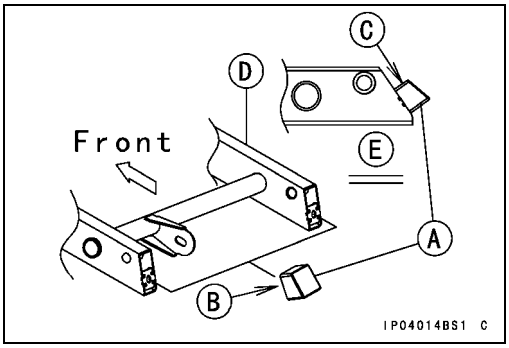


- Remove:
  Snap Pins [A] (both sides)
  Cargo Bed Mounting Pins [B] and Washers [C] (both sides)
  Cargo Bed [D]



Cargo Bed Installation

- When installing the dampers [A], apply an adhesive [B] and install them so that the “UP” mark [C] faces upward.
  Frame [D]
  Left Side View [E]



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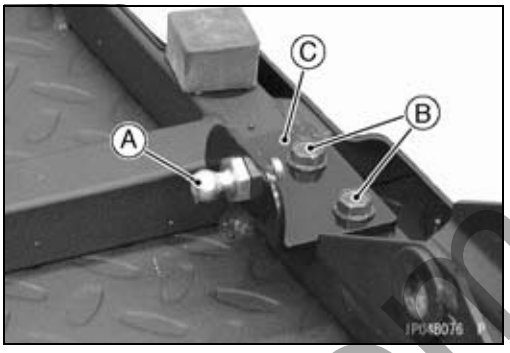
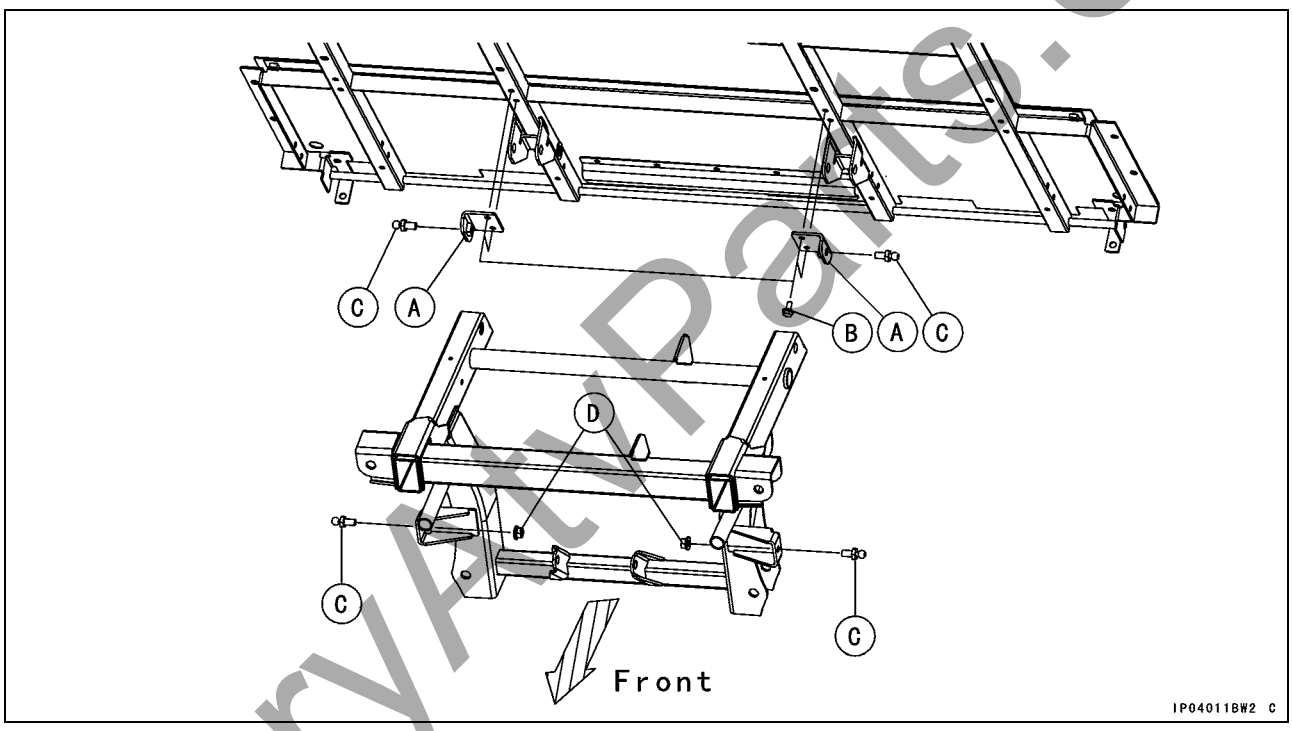
Cargo Bed

● When replacing the studs [A], do the following procedures.

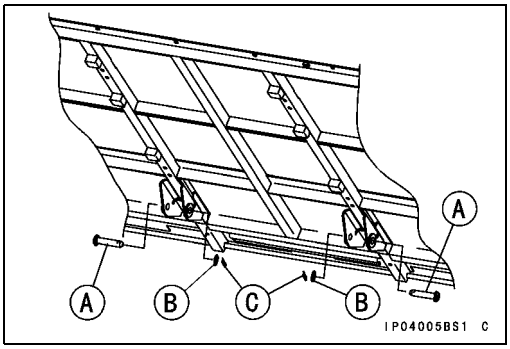
○Remove:
Studs
Bolts [B] and Bracket [C] (for both Upper Sides)



○Install:
Bracket [A] and Bolts [B] (for Upper Side)
Studs [C]
Nuts [D]



● Grease to the cargo bed mounting pins [A].
● Install:
Cargo Bed
Cargo Bed Mounting Pins, Washers [B] and Snap Pins [C]



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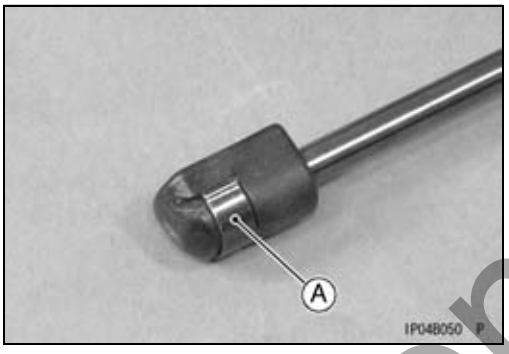
Cargo Bed

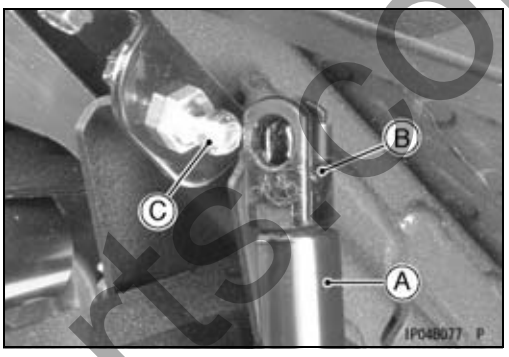
● Install the gas spring dampers following procedure as follows.

○Push the both clamps [A] of the gas spring damper until they are bottomed as shown in the figure.



○Position the cylinder [A] to upper side.

○Push and fit the gas spring damper [B] on the stud [C].

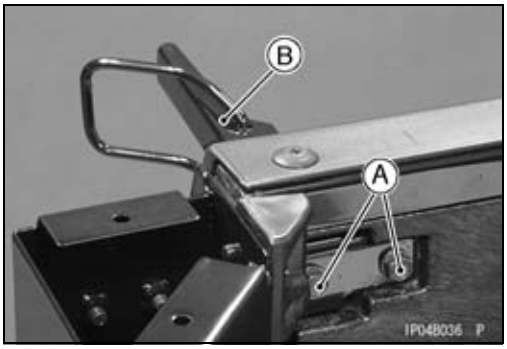


● Install the harness into the clamps.

● Install:
Tail/Brake Light Lead Connectors
Rear Fenders (see Rear Fender Installation)

Cargo Bed Disassembly

● Remove:
Rear Fenders (see Rear Fender Removal)
Bolts [A]
Hook Lever [B] Bracket



● Remove:
Screws [A]

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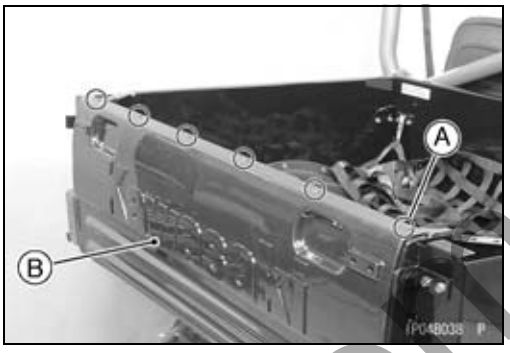
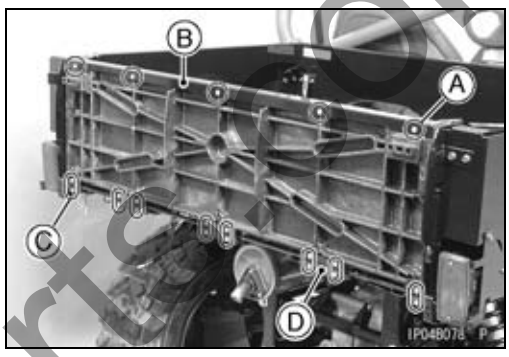
Cargo Bed

- Remove:
  Screw Rivets [A]
  Tail Gate Cover [B]

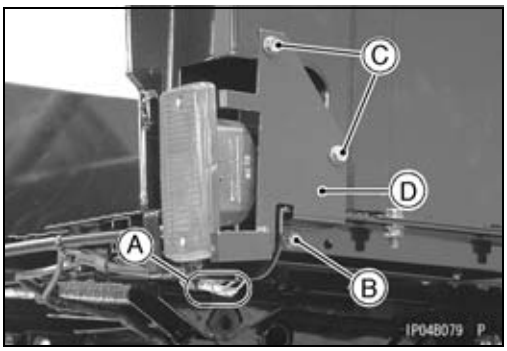


- Remove:
  Screws [A]
  Reinforce [B]
  Screws [C]
  Stoppers [D]

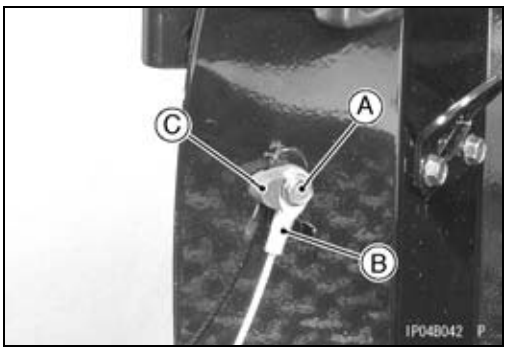


- Remove:
  Tail Gate [A]

- Disconnect the taillight lead connectors [A].
- Remove:
  Bolt [B] and Nut
  Bolts [C]
  Taillight Bracket [D]



- Remove:
  Bolts [A] (both sides)
  Wires [B] (both sides)
  Dampers [C] (both sides)
  Collar (both sides)



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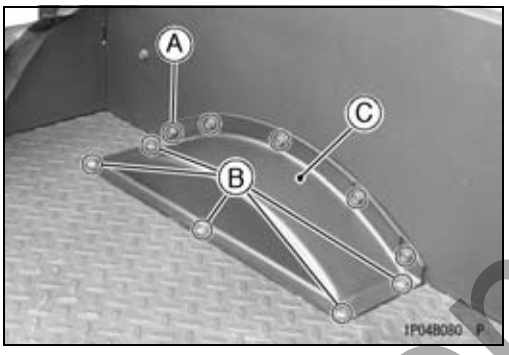
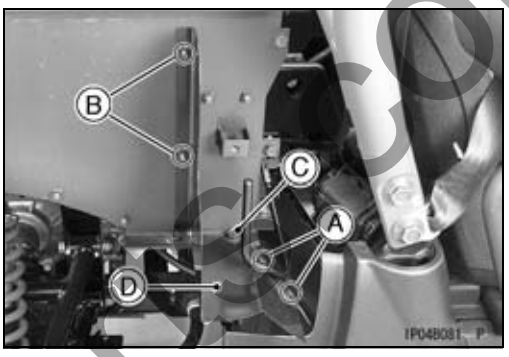
Cargo Bed

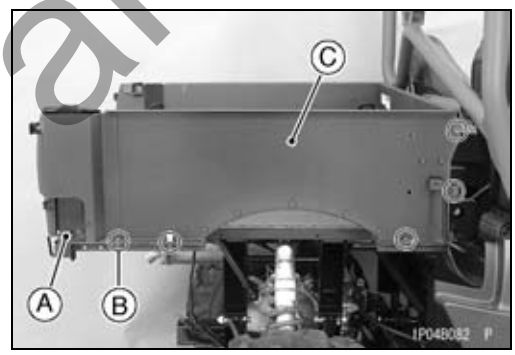
- Remove:
  Bolts [A] and Collars (both sides)
  Screws [B] and Collars (both sides)
  Middle Rear Fenders [C] (both sides)



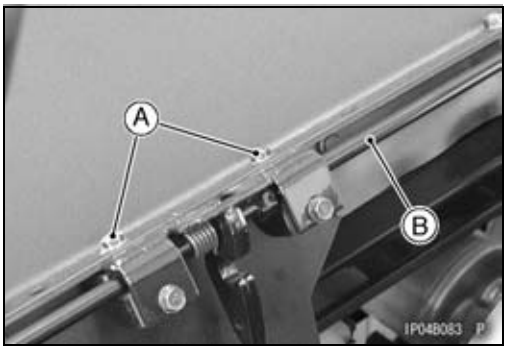
- Remove:
  Quick Rivets [A]
  Bolts [B]
  Bolt [C] and Nut
  Plate [D]



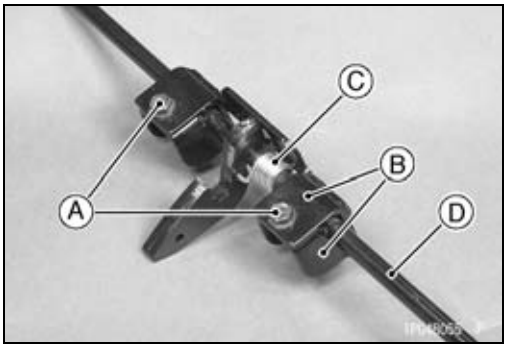
- Remove:
  Bolt [A] (both sides)
  Bolts [B] and Nuts (both sides)
  Plates [C] (both sides)



- Remove:
  Bolts [A] (both sides)
  Hook Lever Assembly [B]



- Remove:
  Bolts [A] (both sides)
  Brackets [B] (both sides)
  Spring [C] (both sides)
  Hook Lever [D]



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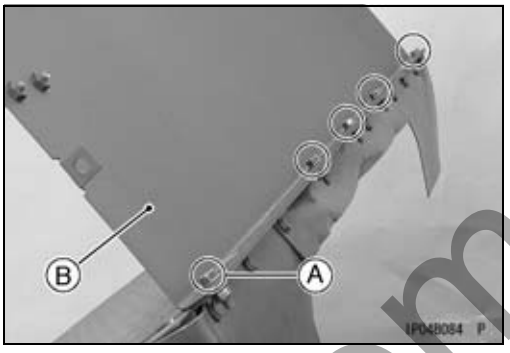
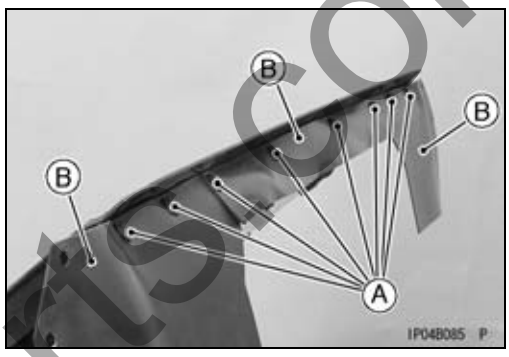
Cargo Bed

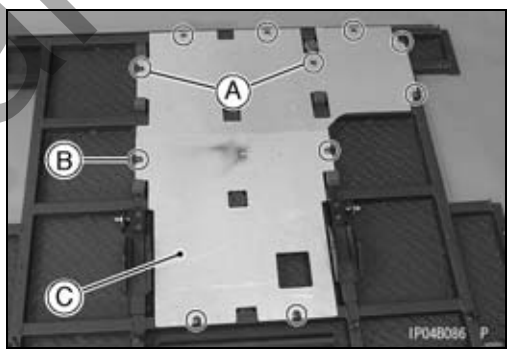
● Remove:
Bolts [A] and Nuts
Plate [B]



● Remove:
Quick Rivets [A]
Flaps [B]

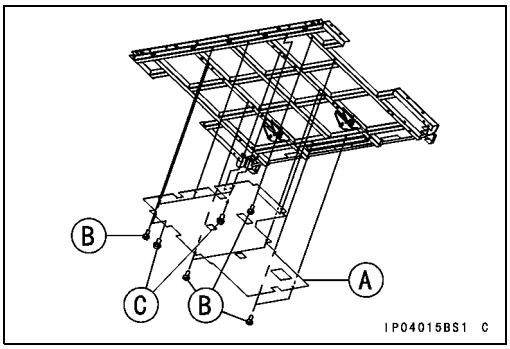


● Remove:
Cargo Bed (see Cargo Bed Removal)
Bolts [A]
Tapping Screws [B]
Heat Guard Plate [C]

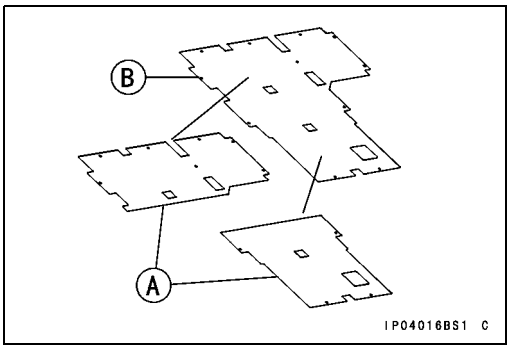


Cargo Bed Assembly

● Install:
Heat Guard Plate [A]
Tapping Screws [B]
Bolts [C]



● When installing the insulators [A] to the heat guard plate [B], install them as shown in the figure.



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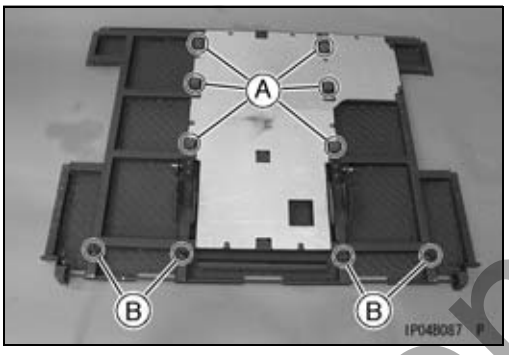
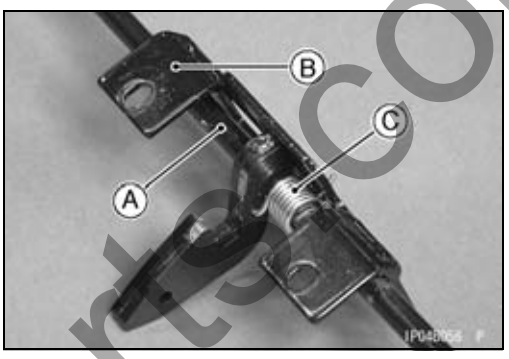
Cargo Bed

- Apply adhesive agent to the cargo bed rubber dampers [A].
- Install:
  Cargo Bed Rubber Dampers
  Clamps [B]



- Install the hook lever following procedure as follows.

○Install:
  Hook Lever [A]
  Bracket [B] (both sides)
  Spring [C] (as shown in the figure, both sides)



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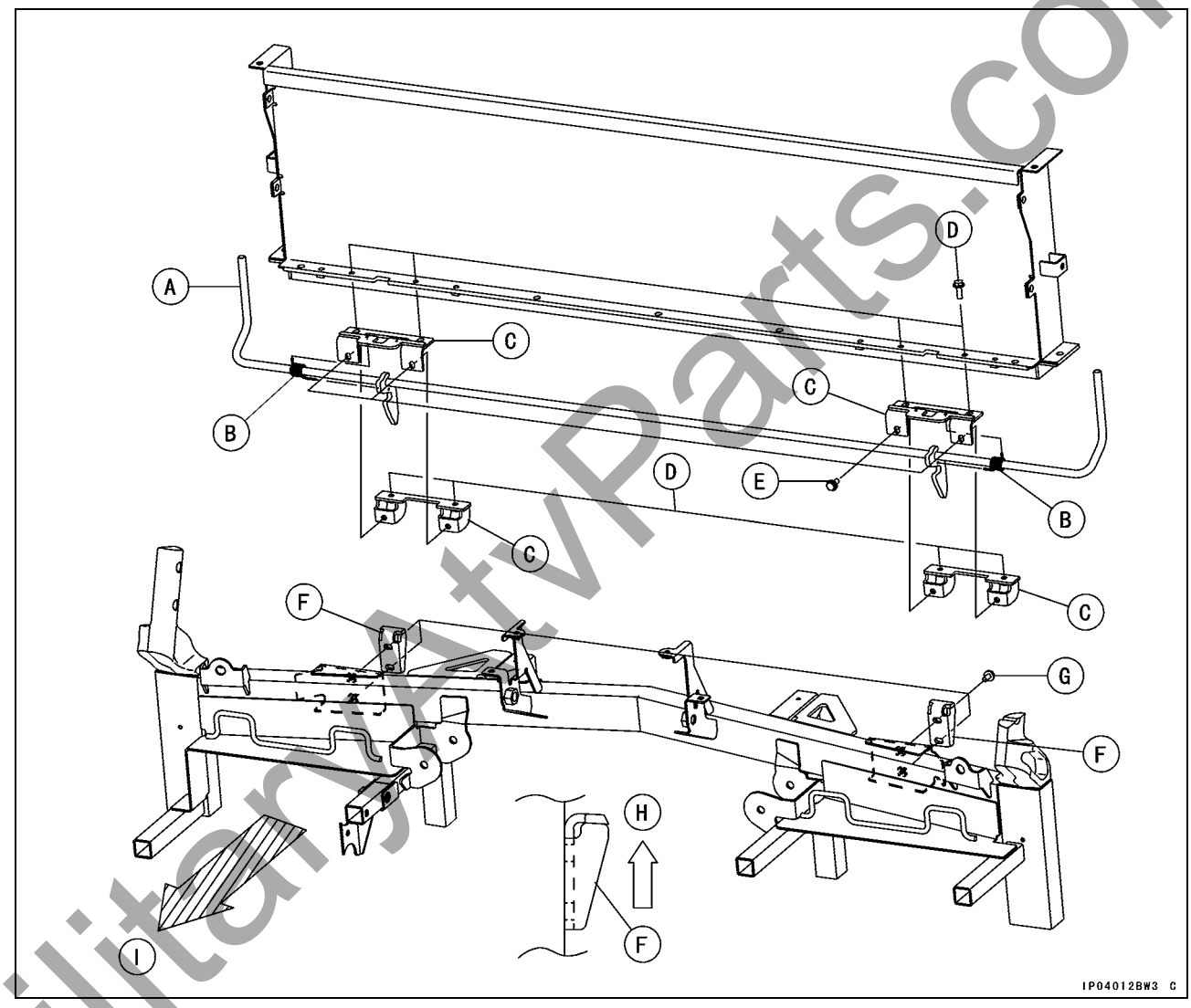
Cargo Bed

○Install:
Hook Lever [A]
Springs [B]
Brackets [C]
Bolts [D]
Bolts [E]
○When installing the hook [F], position it as shown in the figure and tighten the bolts [G].
Upper Side [H]
Front Side [I]



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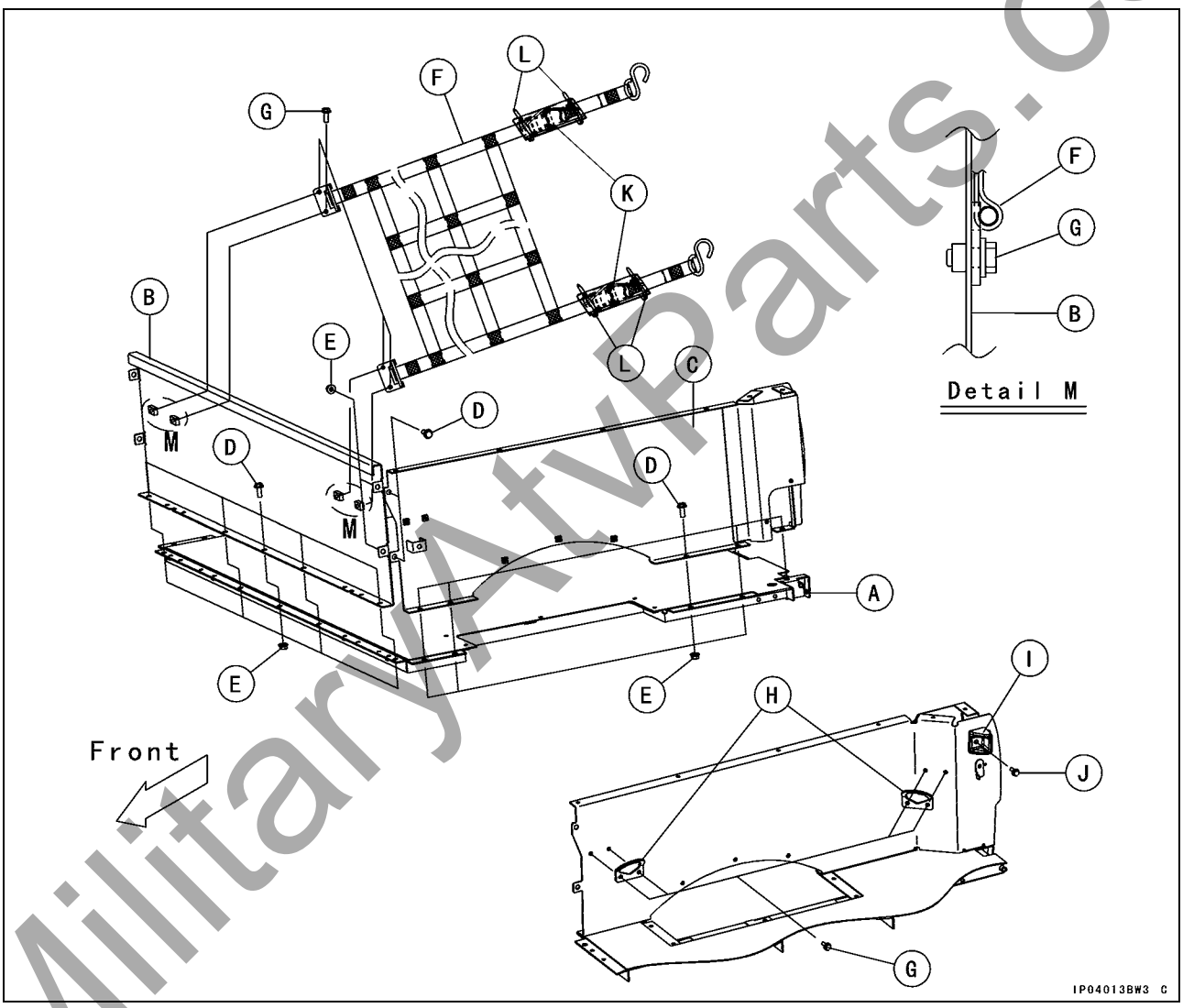
15-38 FRAME

Cargo Bed

● Install:
Cargo Bed Base [A]
Front Plate [B]
Side Plates [C] (both sides)
Bolts [D]: M6, L = 16 mm (0.63 in.)
Nuts [E]
Cargo Net [F]
Bolts [G]: M6, L = 14 mm (0.55 in.)
Hooks [H]
Stopper [I]
Bolts [J]: M6, L = 14 mm (0.55 in.)
Covers [K]
Bands [L]



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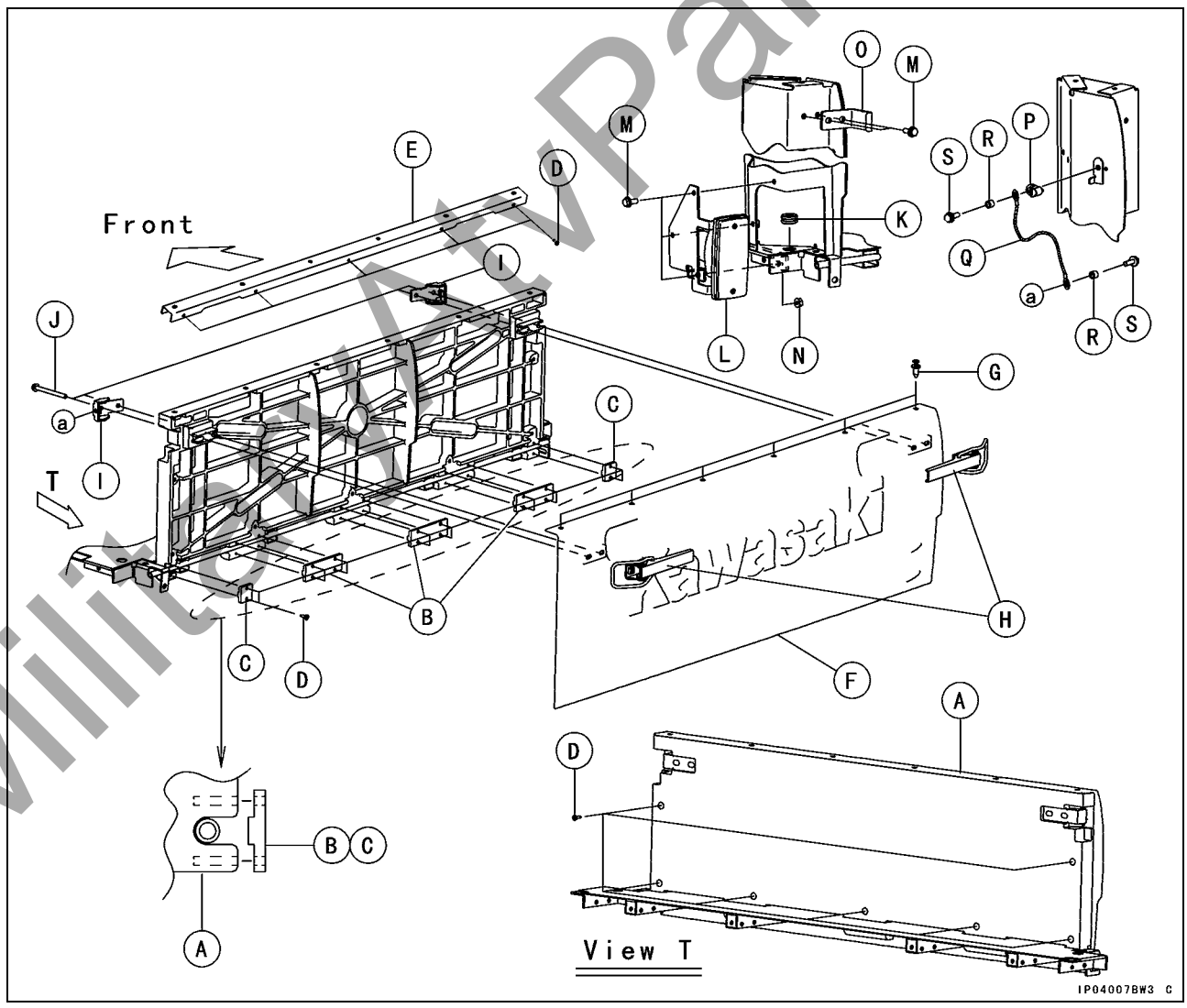
Cargo Bed

● Install:
Tail Gate [A]
Stoppers [B]
Stoppers [C]
Screws [D]
Reinforce [E]
Tail Gate Cover [F]
Screw Rivets [G]
Hook Levers [H]
Brackets [I]
Bolts [J]: M6, L = 65 mm (2.56 in.)
Grommet [K]
Taillight Bracket [L] (both sides)
Bolts [M]: M6, L = 14 mm (0.55 in.)
Nuts [N]
Hooks [O] (both sides)
Dampers [P] (both sides)
Wires [Q] (both sides)
Collars [R]
Bolts [S]: M6, L = 18 mm (0.71 in.)
Rear Fenders (see Rear Fender Installation)



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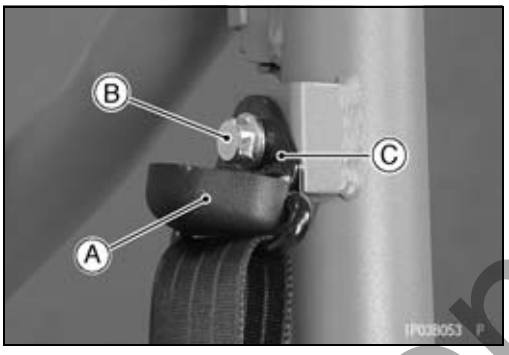
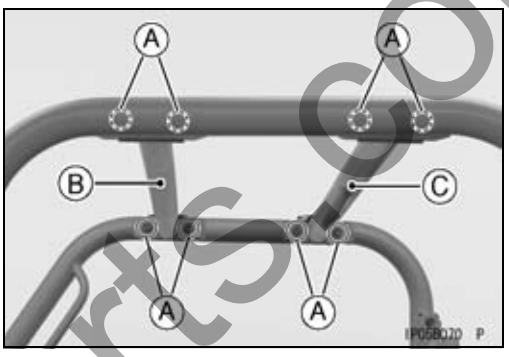
Bars

Right and Left Bars Removal

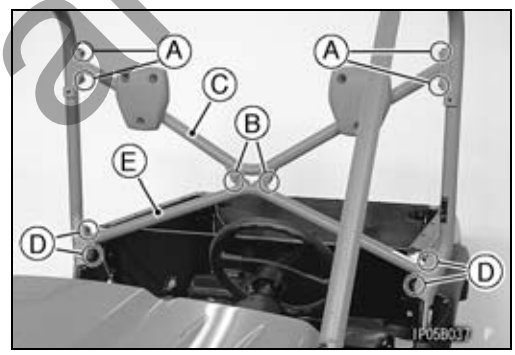
- Remove:
  Seats (see Seat Removal)
- Open the cover [A].
- Remove:
  Seat Belt Mounting Bolt [B]
  Upper Seat Bracket [C]



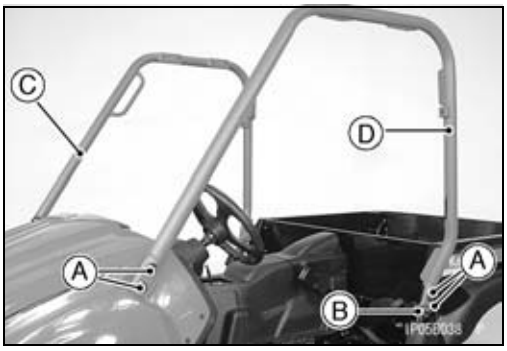
- Remove:
  Upper Bar Mounting Bolts [A]
  Front Upper Bars [B]
  Rear Upper Bars [C]



- Remove:
  Breather Hoses
  Back Bar Mounting Bolts [A]
  Back Bar Mounting Bolts [B]
  Upper Back Bar [C]
  Back Bar Mounting Bolts [D]
  Lower Back Bar [E]

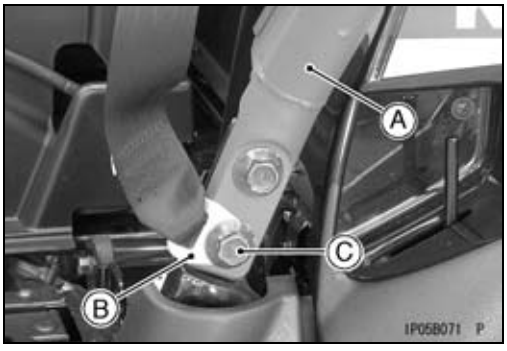


- Remove:
  Mounting Bolts [A] and Lower Seat Bracket [B] (both sides)
  Right Bar [C]
  Left Bar [D]



Right and Left Bars Installation

- Install:
  Right and Left Bar [A]
  Lower Seat Bracket [B] (both sides)
  Mounting Bolts [C] (temporarily)



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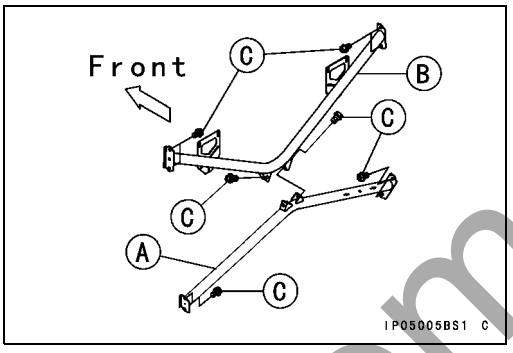
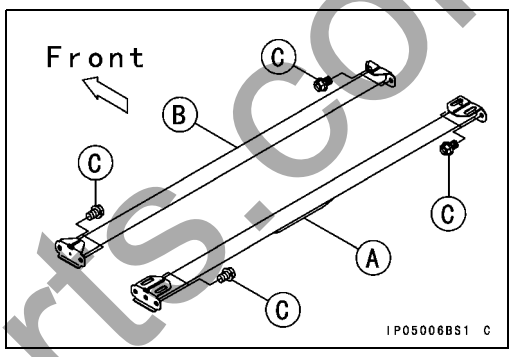
Bars

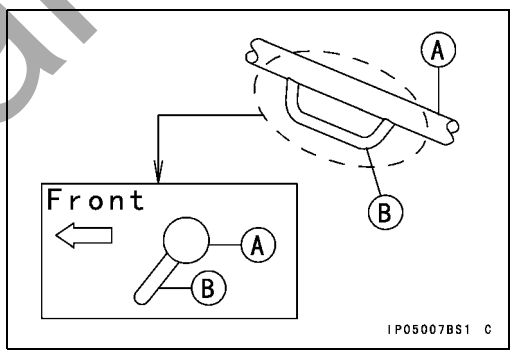
● Install:
Lower Back Bar [A]
Upper Back Bar [B]
Back Bar Mounting Bolts [C] (temporarily)



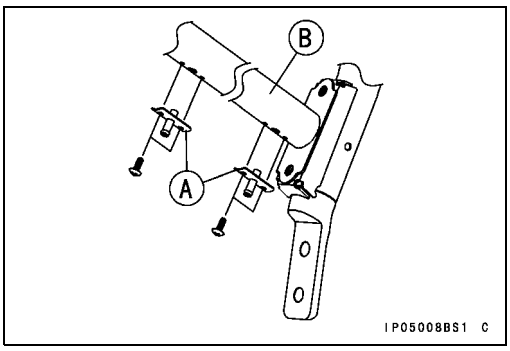
● Install:
Rear Upper Bar [A]
Front Upper Bar [B]
Upper Bar Mounting Bolts [C] (temporarily)



○Install the rear upper bar [A] so that the hand grip [B] faces forward.



● When installing the fittings [A], install them to lower back bar [B] as shown in the figure.



● Tighten:

Torque - Right and Left Bar Mounting Bolts: 98 N·m (10 kgf·m, 72 ft·lb)
Back Bar Mounting Bolts: 46.5 N·m (4.7 kgf·m, 34 ft·lb)
Upper Bar Mounting Bolts: 46.5 N·m (4.7 kgf·m, 34 ft·lb)

● Install the upper seat bracket (see Seat Belt Installation).
● Install the removed parts.

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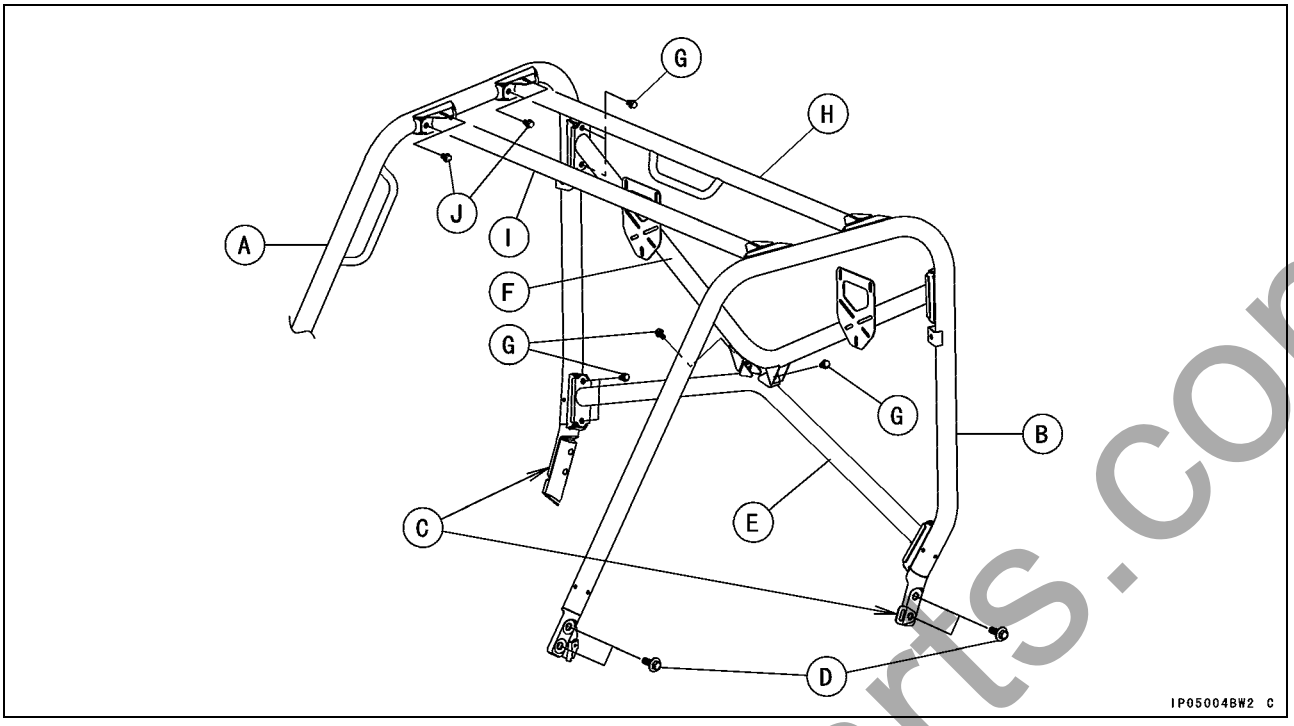
Bars



[A] Right Bar
[B] Left Bar
[C] Lower Seat Brackets (both sides)
[D] Right and Left Bar Mounting Bolts
[E] Lower Back Bar
[F] Upper Back Bar
[G] Back Bar Mounting Bolts
[H] Rear Upper Bar
[I] Front Upper Bar
[J] Upper Bar Mounting Bolts

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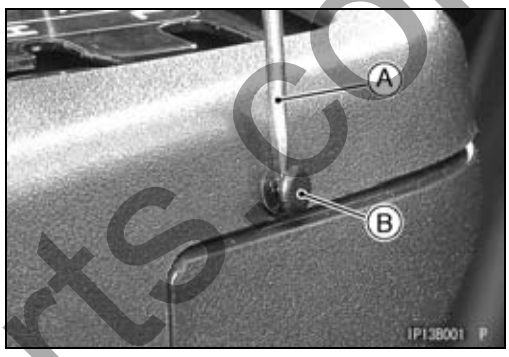
Covers

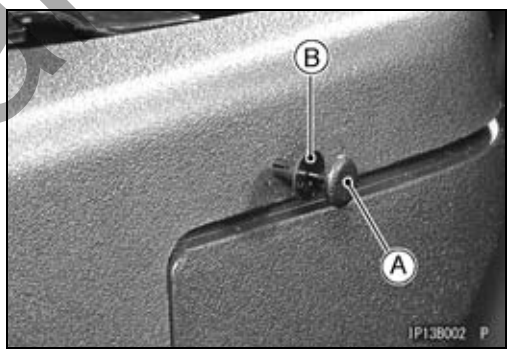
Engine Upper Cover Removal

● Remove:
Seats (see Seat Removal)
Small Quick Rivet [A]
Quick Rivet [B]
Screw [C] and Collar

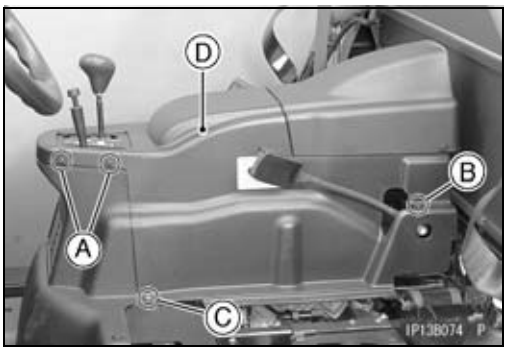
○When removing the small rivet, insert thin driver [A] between the pin [B] and socket.



○Remove the pin [A] and socket [B] from the cover.

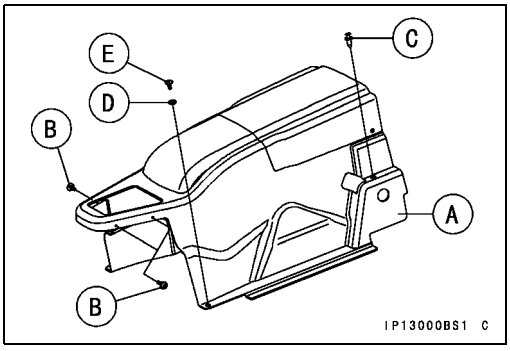


● Remove:
Small Quick Rivets [A]
Quick Rivet [B]
Screw [C] and Collar
Engine Upper Cover [D]



Engine Upper Cover Installation

● Install:
Engine Upper Cover [A]
Small Quick Rivets [B]
Quick Rivets [C] (both sides)
Collars [D] (both sides)
Screws [E]: L = 22 mm (0.87 in.)



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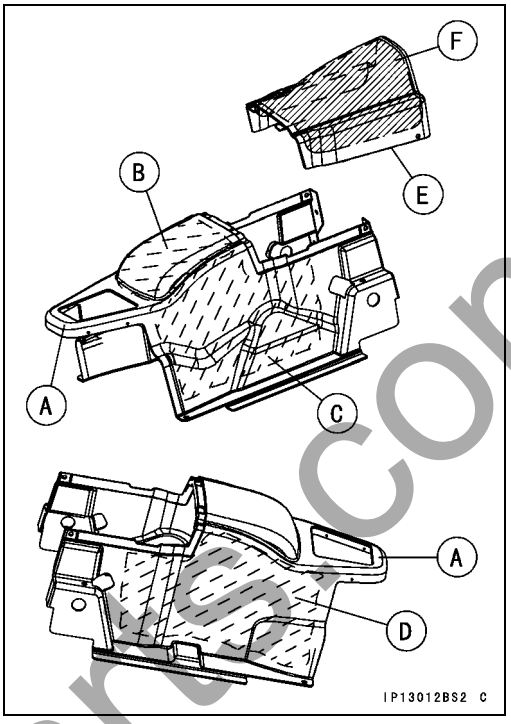
Covers

● When installing the insulators, install them as shown in the figure.

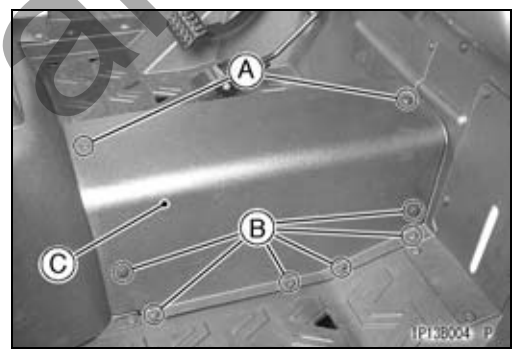
○Do not protrude the insulators beyond the edge of the engine upper cover [A].

Insulator [B] (P/No. 16073-0118)
Insulator [C] (P/No. 16073-0117)
Insulator [D] (P/No. 16073-0116)
Air Cleaner Housing Cap [E]
Insulator [F] (P/No. 16073-0115)



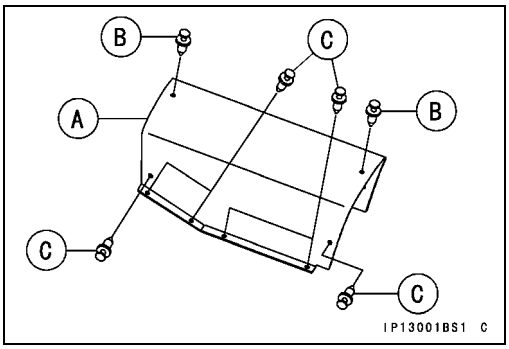
Center Cover Removal

● Remove:
Quick Rivets [A]
Quick Rivets [B] (both sides)
Center Cover [C]



Center Cover Installation

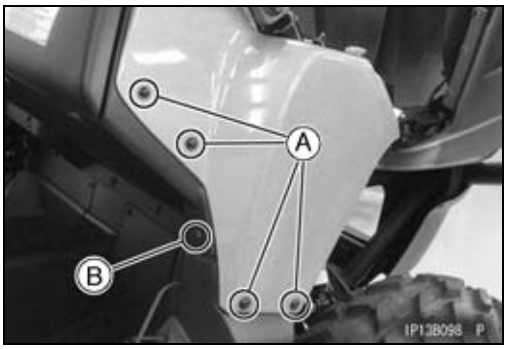
● Install:
Center Cover [A]
Quick Rivets [B]
Quick Rivets [C] (both sides)



Side Cover Removal

Right Side Cover

● Remove:
Right Seat (see Seat Removal)
Screws [A]
Quick Rivet [B]



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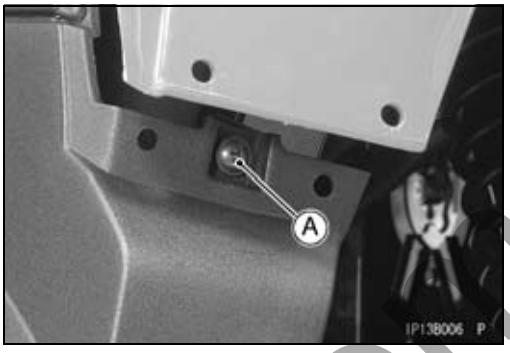
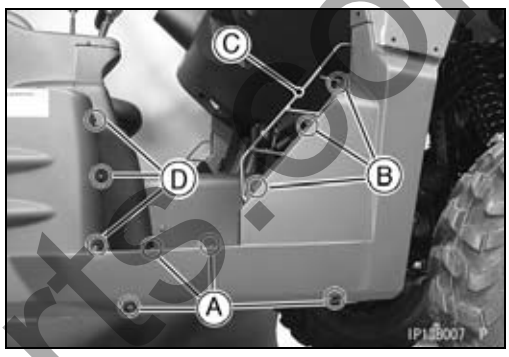
Covers

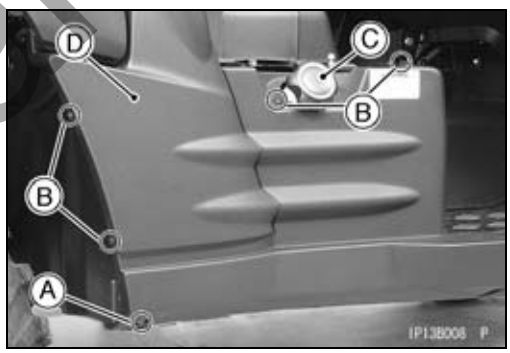
● Remove:
Screw [A] and Collar



● Remove:
Screws [A] and Collars
Screws [B]
Guard [C]
Quick Rivets [D]

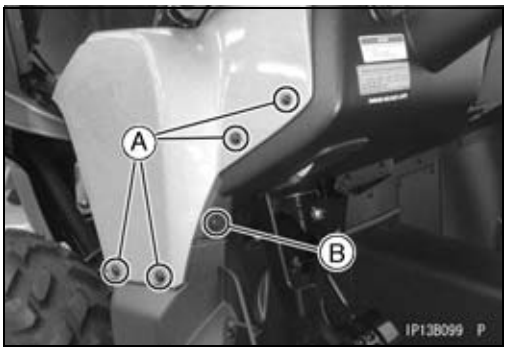


● Remove:
Screw [A] and Collar
Quick Rivets [B]
Fuel Tank Cap [C]
Right Side Cover [D]

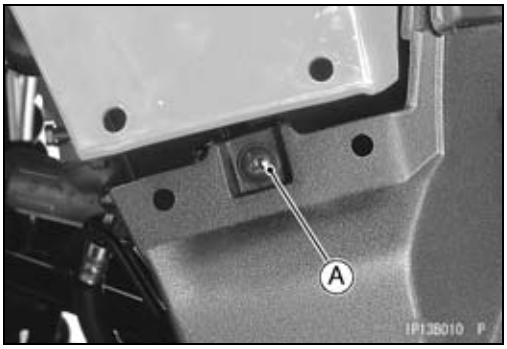


Left Side Cover

● Remove:
Left Seat (see Seat Removal)
Screws [A]
Quick Rivet [B]



● Remove:
Screw [A] and Collar



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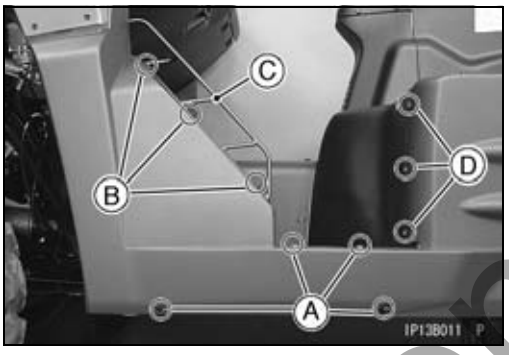
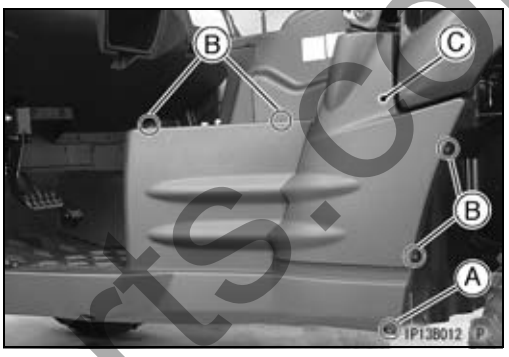
Covers

● Remove:
Screws [A] and Collars
Screws [B]
Guard [C]
Quick Rivets [D]

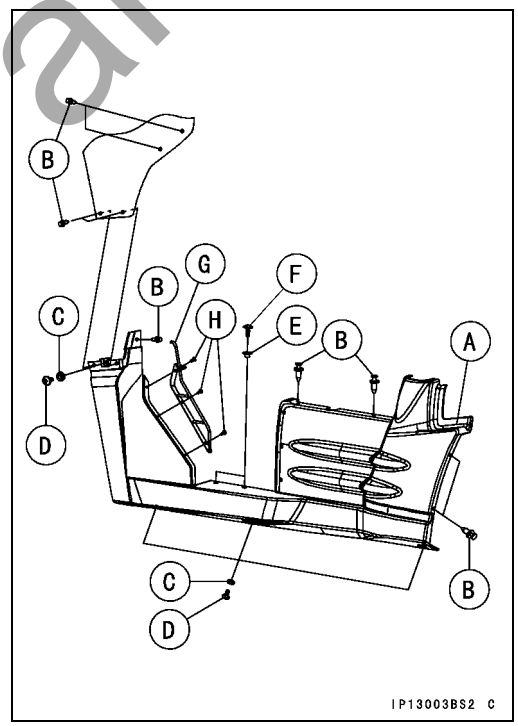


● Remove:
Screw [A] and Collar
Quick Rivets [B]
Left Side Cover [C]



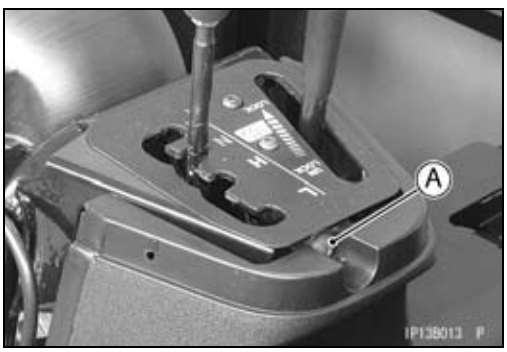
Side Cover Installation

● Install:
Right Side Cover [A]
Quick Rivets [B]
Collars [C]: L = 4 mm (0.16 in.)
Screws [D]: M6, L = 16 mm (0.63 in.)
Collars [E]: L = 7.2 mm (0.28 in.)
Screws [F]: M6, L = 22 mm (0.87 in.)
Guard [G]
Screws [H]: M5
● Install the left side cover according to the same procedure as the right side cover.
● Install:
Fuel Tank Cap (Right Side)



Seat Lower Cover Removal

● Remove:
Engine Upper Cover (see Engine Upper Cover Removal)
Center Cover (see Center Cover Removal)
Screw [A] and Collar



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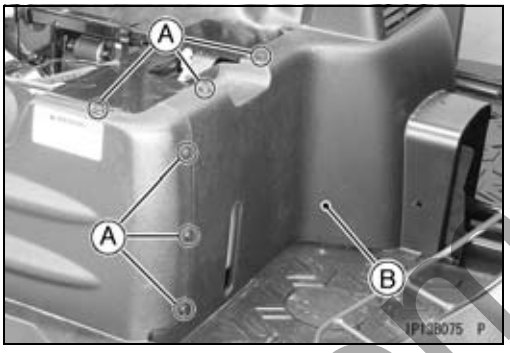
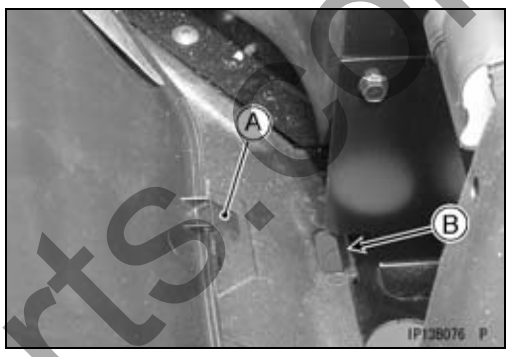
Covers

● Remove:
Quick Rivets [A] (both sides)
Seat Lower Cover [B]

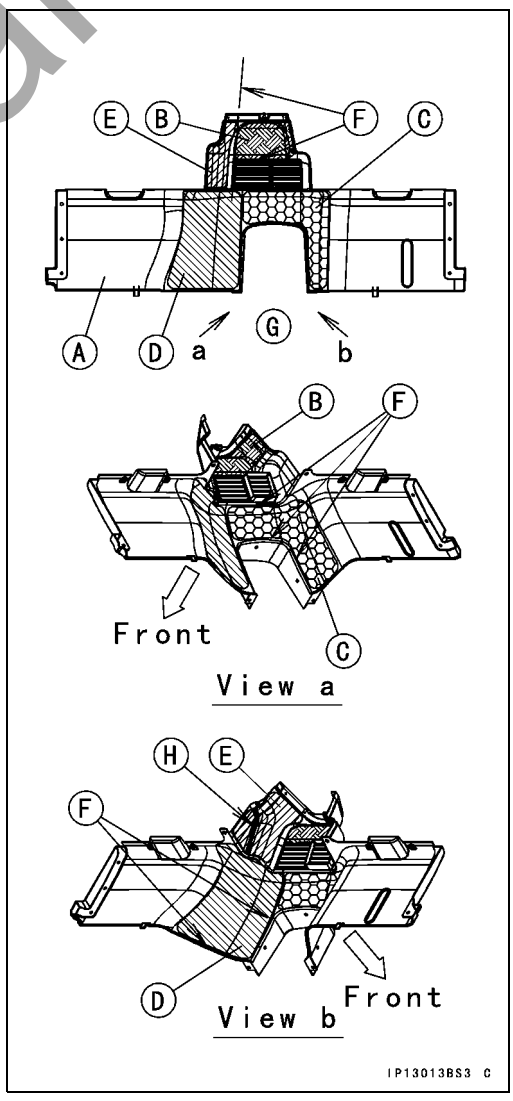


Seat Lower Cover Installation

● Insert the projection [A] of the cover into the hole [B]. (both sides).



● When installing the insulators, install them as shown in the figure.
○Wipe the seat lower cover by alcohol before sticking the insulators.
○Do not protrude the insulators beyond the edge of the seat lower cover [A].
Insulator [B] (P/No. 16073-0119)
Insulator [C] (P/No. 16073-0120)
Insulator [D] (P/No. 16073-0121)
Insulator [E] (P/No. 16073-0122)
Standard Line to Stick [F]
Frame [E]
Rear View (Inside of Seat Lower Cover) [G]
● Stick the insulator [E] so that the press line matches the corner [H].



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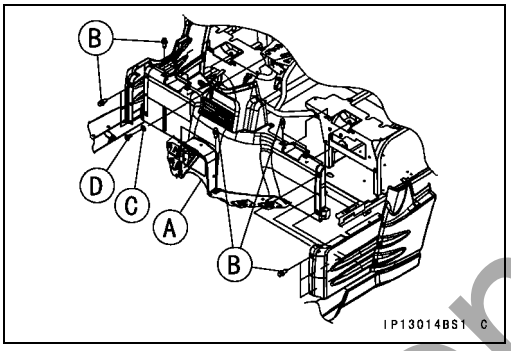
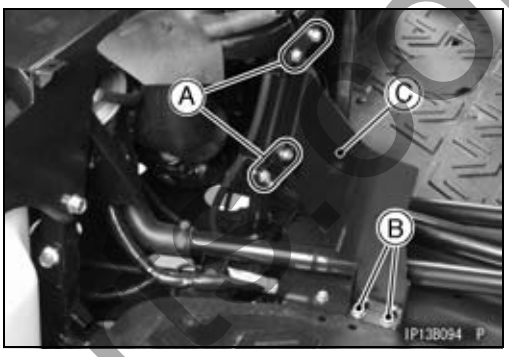
Covers

● Install:
Seat Lower Cover [A]
Quick Rivets [B]
Collar [C]: L = 4 mm (0.16 in.)
Screw [D]: L = 16 mm (0.63 in.)



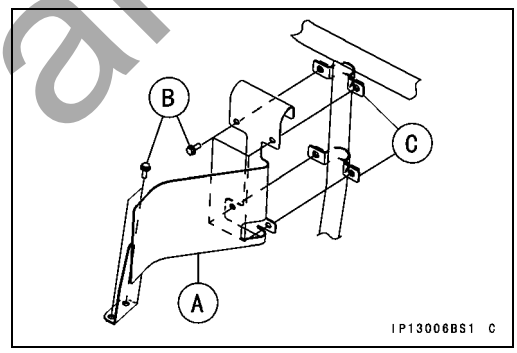
Seat Lower Right Plate Removal

● Remove:
Seat Lower Cover (see Seat Lower Cover Removal)
Bolts [A] and Brackets
Bolts [B]
Seat Lower Right Plate [C]



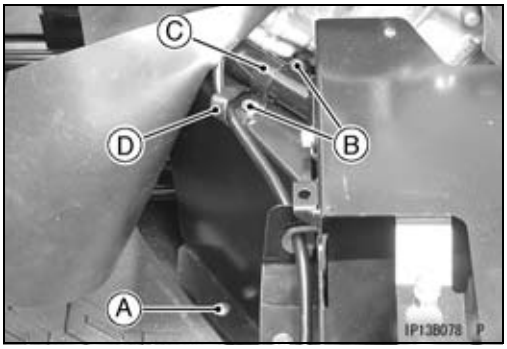
Seat Lower Right Plate Installation

● Install:
Seat Lower Right Plate [A]
Bolts [B] and Brackets [C]

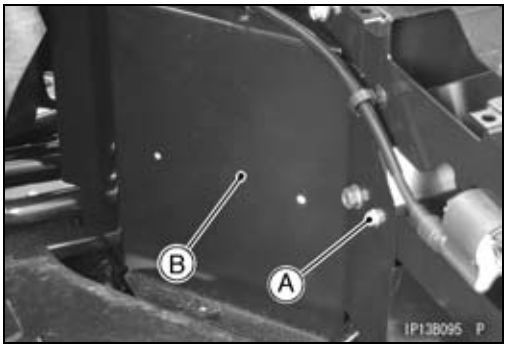


Seat Lower Left Plate Removal

● Removal:
Seat Lower Cover (see Seat Lower Cover Removal)
Tapping Screw [A]
Bolts [B] and Bracket [C]
Clamp [D]



● Removal:
Bolt [A]
Seat Lower Left Plate [B]



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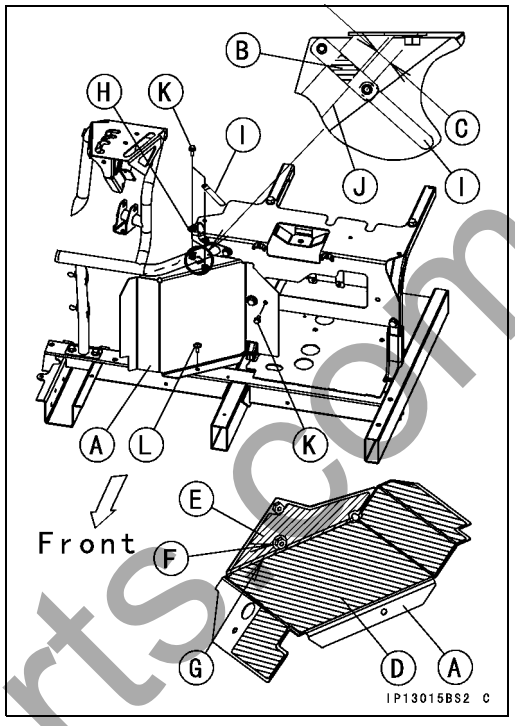
Covers

Seat Lower Left Plate Installation



- When installing the insulators and damper on the seat lower left plate [A], install them as shown in the figure.
  Damper [B] (P/No. 92161-0273)
  15 mm (0.59 in.) [C]
  Insulator [D] (P/No. 16073-0112)
  Insulator [E] (P/No. 16073-0113)

○Match the center of the hole to the center of the nut [F].
○Match the edges of the insulators [G].

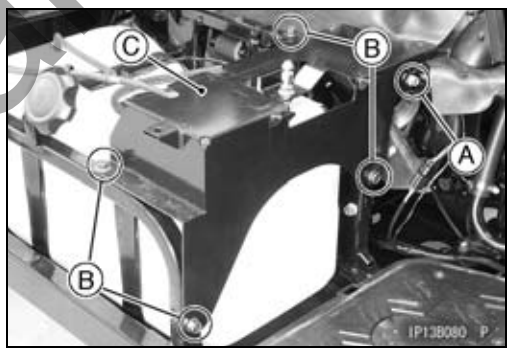
- Install:
  Bracket [H]
  Clamp [I]

○Install the clamp in the right angle direction of the pipe [J].

- Install:
  Bolts [K]
  Tapping Screw [L]

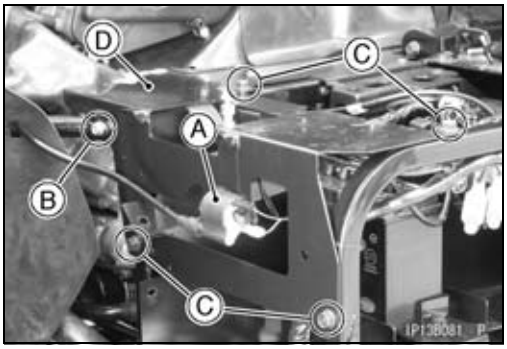
Right and Left Brackets Removal

Right Bracket



- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal)
  Right Side Cover (see Side Cover Removal)
  Center Bracket Mounting Bolt [A]
  Bracket Bolts [B]
  Right Bracket [C]

Left Bracket



- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal)
  Left Side Cover (see Side Cover Removal)
  Seat Lower Left Plate (see Seat Lower Left Plate Removal)
  Ignition Coil [A]
  Center Bracket Mounting Bolt [B]
  Bracket Bolts [C]
  Left Bracket [D]

- Remove the leads [A] from the clamp.

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Covers

Right and Left Brackets Installation

- Install:
  Right and Left Brackets
  Bracket Bolts
- Tighten:

Torque - Bracket Bolts: 47 N·m (4.8 kgf·m, 35 ft·lb)
Center Bracket Mounting Bolts: 22 N·m (2.2 kgf·m, 16 ft·lb)

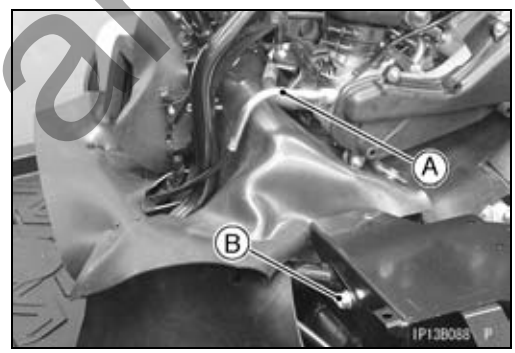
- Install the removed parts.

Center Bracket Removal

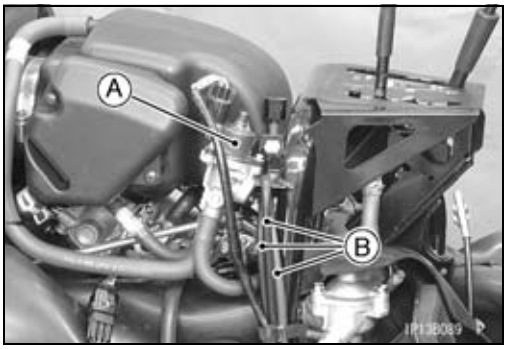
- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Seat Lower Left Plate (see Seat Lower Left Plate Removal in the Frame chapter)
  Seat Lower Right Plate (see Seat Lower Right Plate Removal in the Frame chapter)
  Right Bracket (see Right and Left Brackets Removal in the Frame chapter)

(For Center Bracket Assembly Removal)

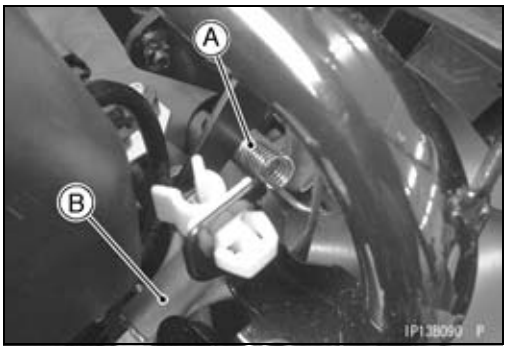
- Remove:
  Throttle Cable Rear End [A]
  Center Bracket Mounting Bolt [B]



- Remove:
  ISC Valve [A] (ISC Valve Removal in the Fuel System (DFI) chapter)
  Breather Hoses [B]



- Remove:
  Spring [A]
  Shift Lever Tie-rod End [B]



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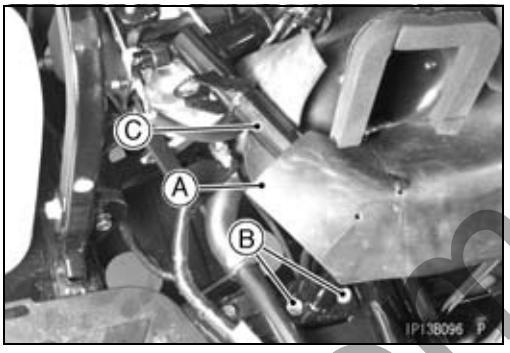
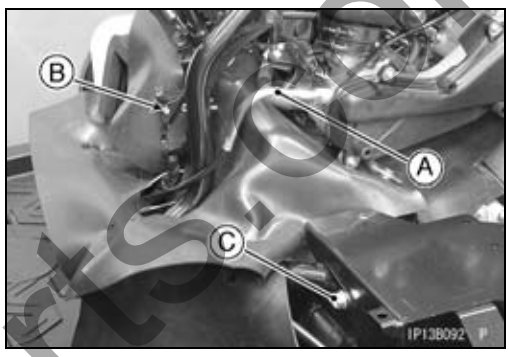
Covers

● Remove:
Rubber Cover [A]
Center Bracket Mounting Bolts [B]
Center Bracket [C]

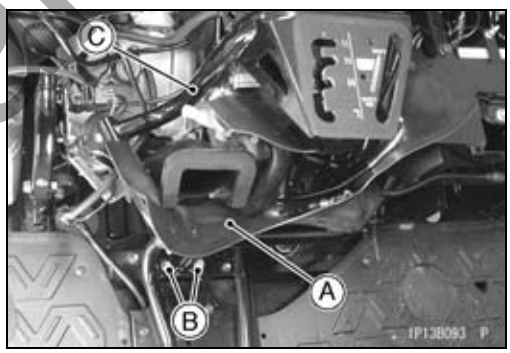


(For Center Bracket Unit Removal)

● Remove:
Throttle Cable Rear End [A]
Differential Shift Cable Rear End [B]
Center Bracket Mounting Bolt [C]
Differential Shift Lever Removal (see Differential Shift Lever Removal in the Final Drive chapter)
Shift Lever (see Shift Lever Removal in the Crankshaft/Transmission chapter)



● Remove:
Band and Harnesses
Rubber Cover [A]
Center Bracket Mounting Bolts [B]
Center Bracket [C]

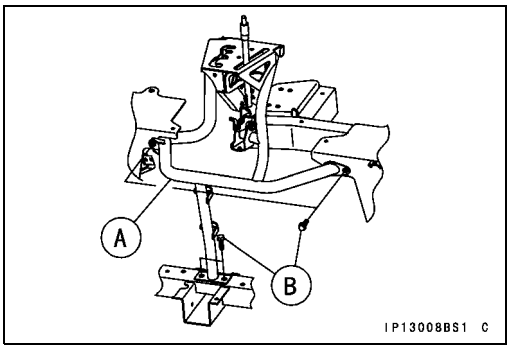


Center Bracket Installation

● Install:
Center Bracket Assembly [A]
Center Bracket Mounting Bolts [B]
● Tighten:

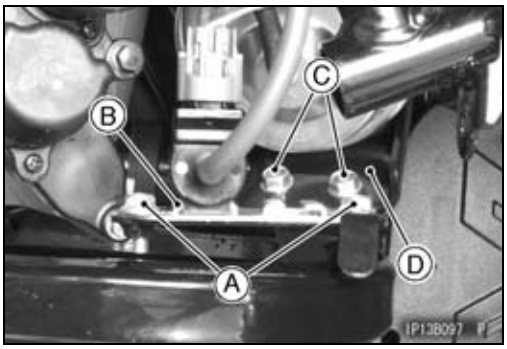
Torque - Center Bracket Mounting Bolts: 22 N·m (2.2 kgf·m, 16 ft·lb)

● Install the removed parts.



Right Frame Pipe Removal

● Remove:
Fuel Tank (Fuel Tank Removal in the Fuel System chapter)
Solenoid Valve Bracket Bolts [A] and Bracket Assembly [B]
Vacuum Actuator Bracket Bolts [C] and Bracket Assembly [D]



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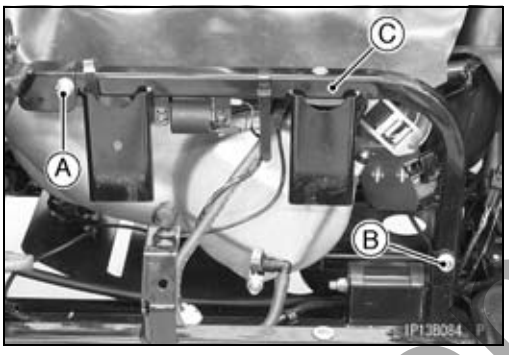
Covers

- Remove:
  Right Frame Pipe Mounting Bolt [A] and Nut
  Right Frame Pipe Mounting Bolt [B]
  Right Frame Pipe [C]



Right Frame Pipe Installation

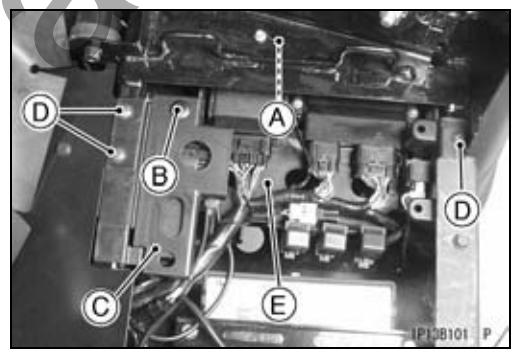
- Install:
  Right Frame Pipe and Bolts
- Tighten:

Torque - Right Frame Pipe Mounting Bolts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)
Vacuum Actuator Bracket Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Solenoid Valve Bracket Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

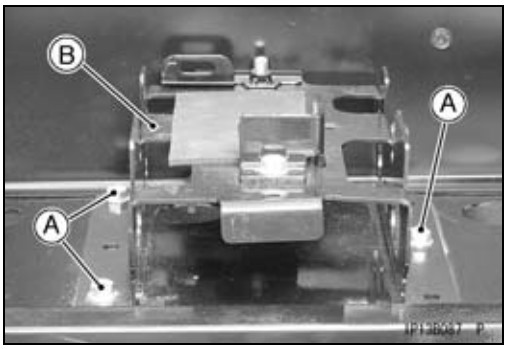
- Install the removed parts.

Left Cover Removal

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal)
  Left Bracket (see Right and Left Brackets Removal)
  Battery (see Battery Removal in the Electrical System chapter)
  Vehicle-down Sensor [A] (see Vehicle-down Sensor Removal in the Fuel System (DFI) chapter)
  Quick Rivet [B] and Cover [C]
  Tapping Screws [D] and Collars
  Electric Parts Case [E]



- Remove:
  Bolts [A]
  Battery Mounting Plate [B]



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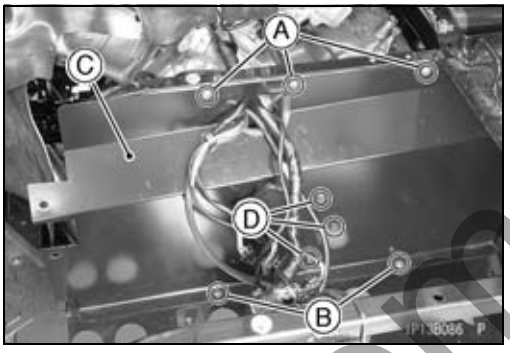
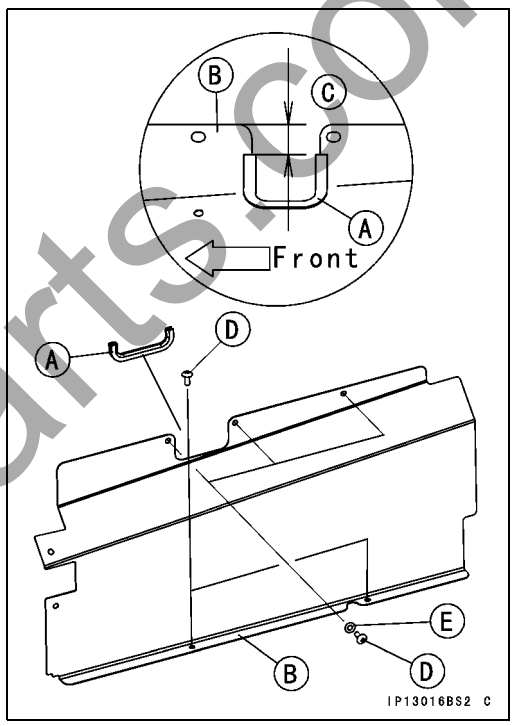
Covers

● Remove:
Tapping Screws [A] and Washers
Tapping Screws [B]
Left Cover [C]
○Remove the bolts [D] and plate, if necessary.



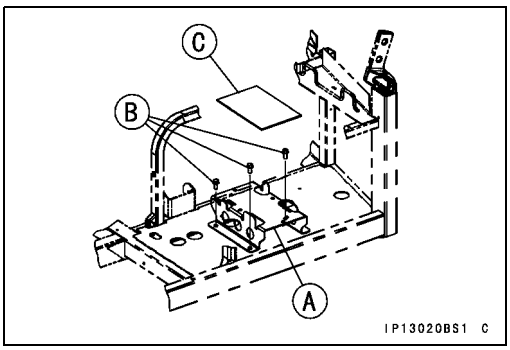
Left Cover Installation

● When installing the trim seal [A] to the left cover [B], apply adhesive to the trim seal and install it as shown in the figure.
24 ±1 mm (0.94 ±0.04 in.) [C]
● Install:
Left Cover
Tapping Screws [D]
Washers [E]



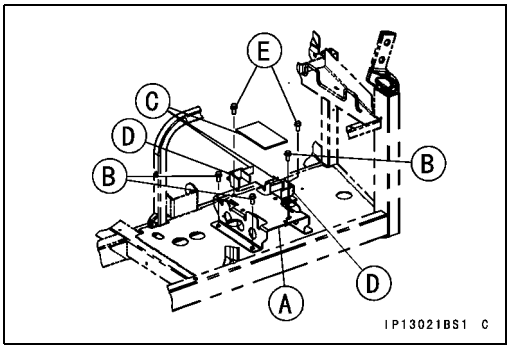
(For US Model)

● Install:
Battery Mounting Plate [A]
Bolts [B]
● When the following part is removed, install it.
Damper [C]
● Install the removed parts.



(For CA Model)

● Install:
Battery Mounting Plate [A]
Bolts [B]
● When the following parts are removed, install them as shown in the figure.
Dampers [C]
Brackets [D]
Bolts [E]
● Install the removed parts



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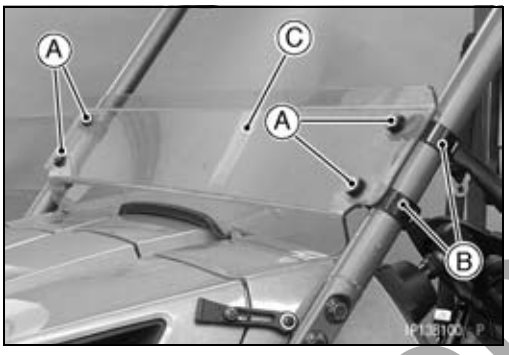
Covers

Windshield Removal (KRF750P/R Models)



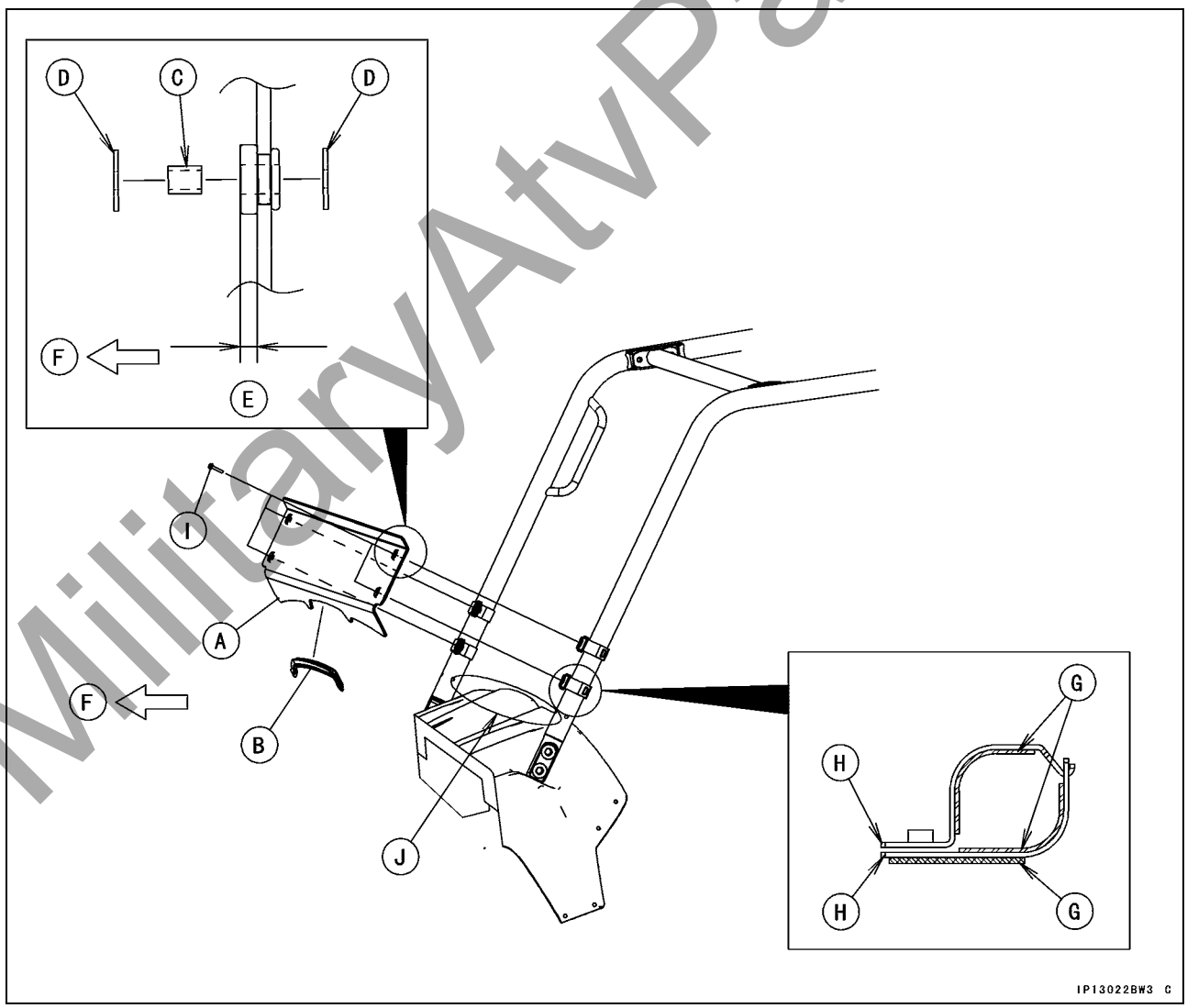
- Remove:
  Bolts [A] and Washers
  Brackets [B], Dampers and Collars
  Windshield [C]

Windshield Installation (KRF750P/R Models)

- Install:
  Windshield [A]
  Trim [B]
  Collars [C]
  Washers [D]

○Thick side [E] is front side [F].

- Install:
  Dampers [G]
  Brackets [H]
  Bolts [I]
  [J] Fit the trim on the front fender rear.



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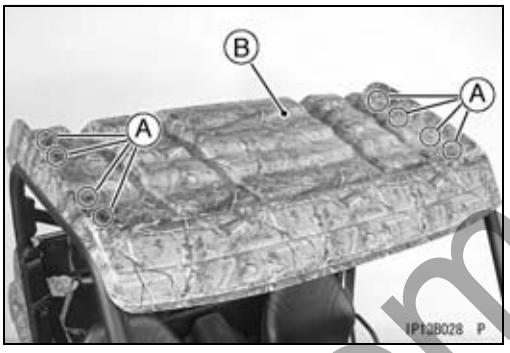
Covers

Sun Top Cover Removal (KRF750P/R Models)

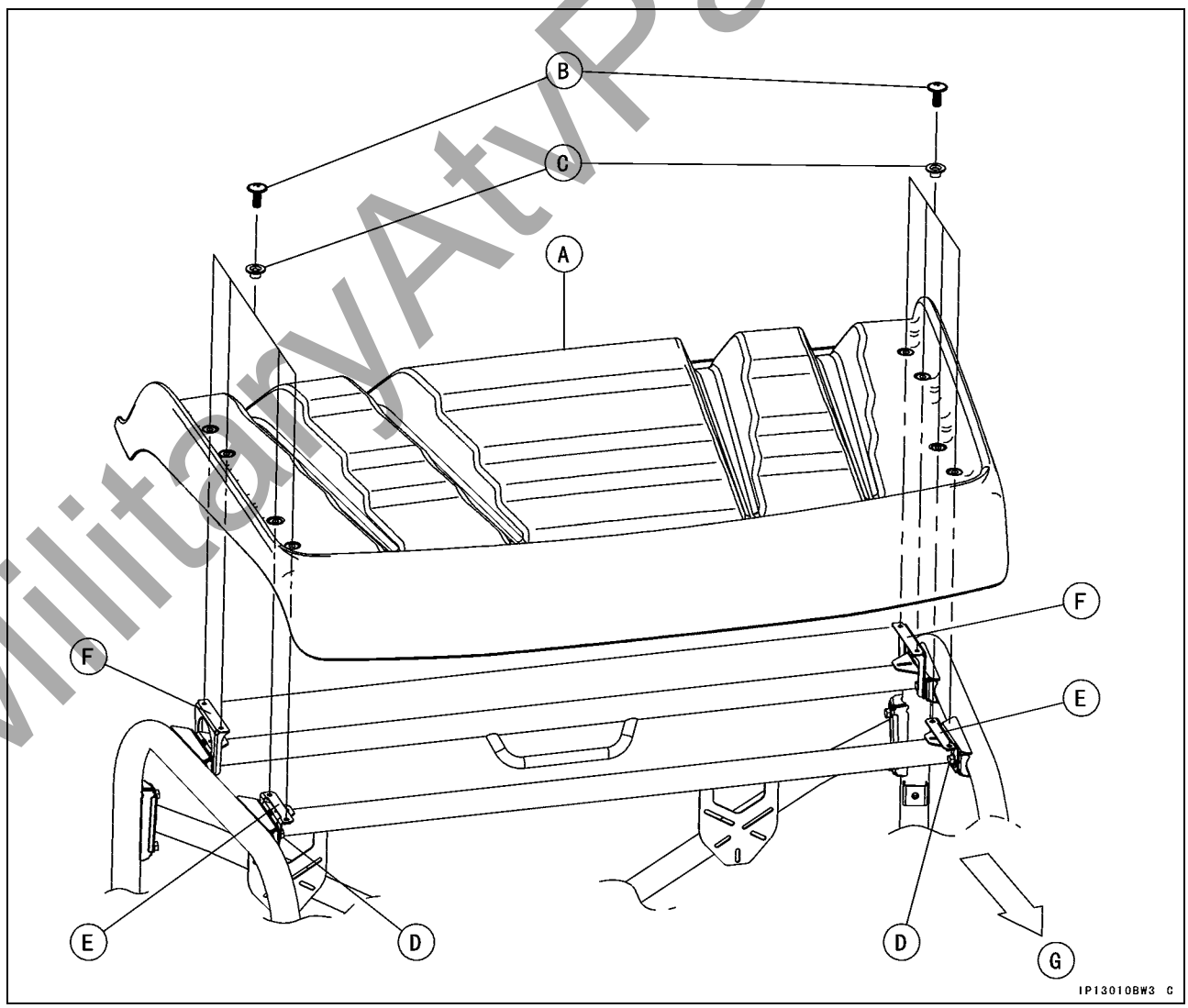


● Remove:
Screws [A] and Collars
Sun Top Cover [B]

Sun Top Cover Installation (KRF750P/R Models)

● Install:
Sun Top Cover [A]
Screws [B] and Collars [C]
● When installing the brackets, install them with the upper bar mounting bolts [D].
Small Bracket [E]
Large Bracket [F]
Front Side [G]
○Tighten:

Torque - Upper Bar Mounting Bolts: 47 N·m (4.8 kgf·m, 35 ft·lb)



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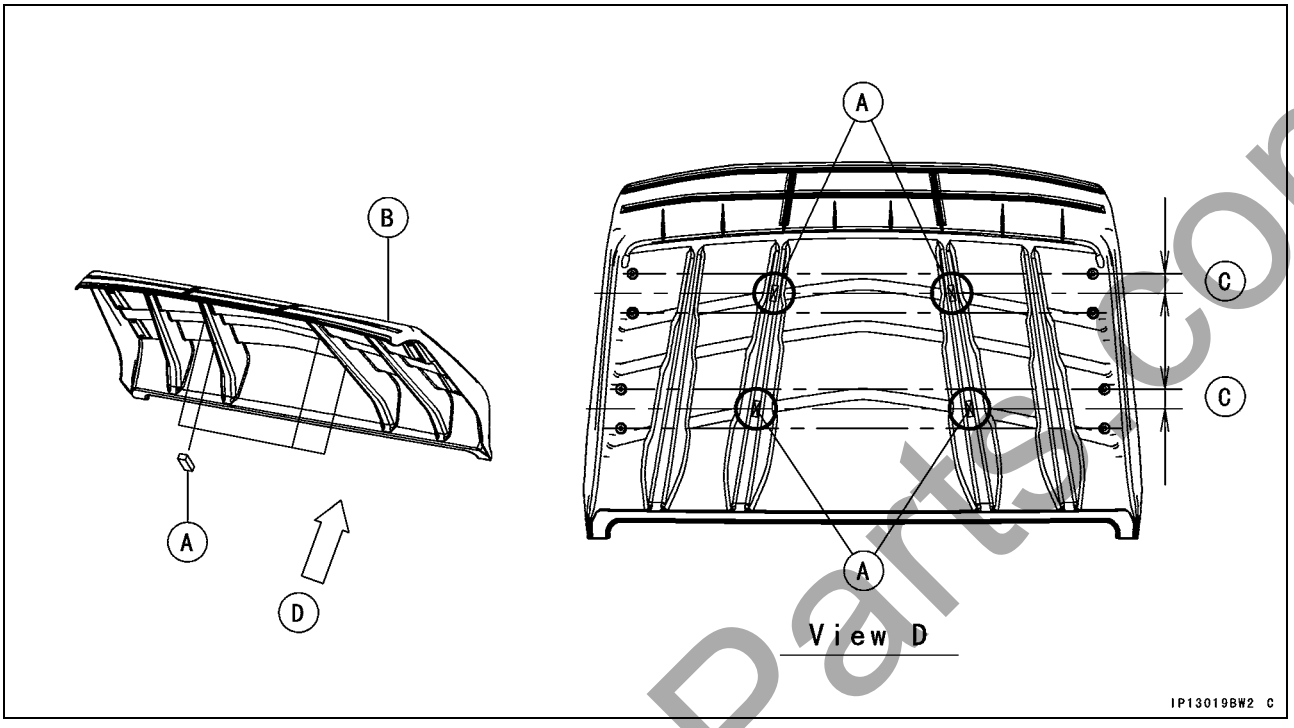
Covers

- When installing the pads [A], install them on the rib of the front fender as shown in the figure.
  Sun Top Cover [B]
  49 mm (1.93 in.) [C]



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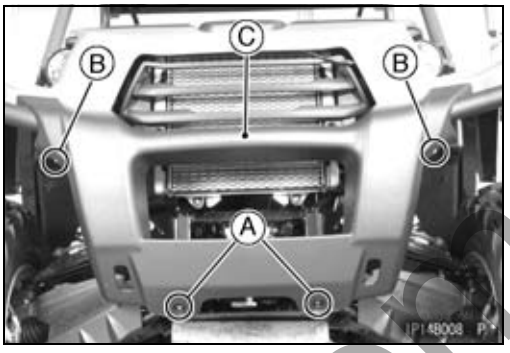
Guards

Front Guard Removal

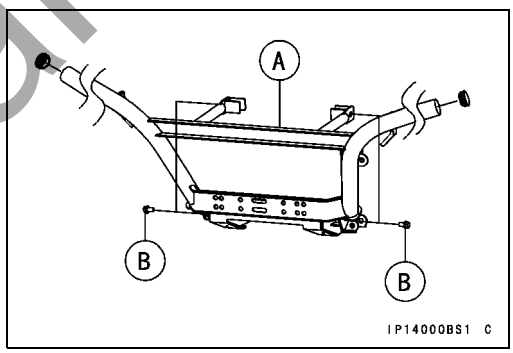
● Remove:
Tapping Screws [A] and Collars
Screws [B] and Collars
Front Guard Cover [C]



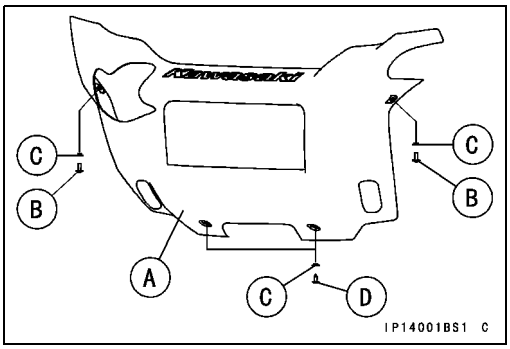
● Remove:
Bolts [A] (both sides)
Front Guard [B]

Front Guard Installation

● Install:
Front Guard [A]
Bolts [B]

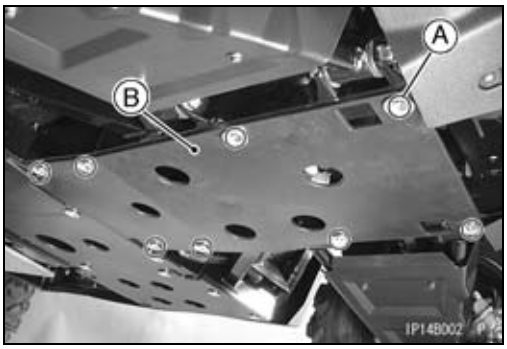


● Install:
Front Guard Cover [A]
Screws [B] and Collars [C]
Tapping Screws [D]



Front Bottom Guard Removal

● Remove:
Bottom Guard Bolts [A] and Collars
Front Bottom Guard [B]



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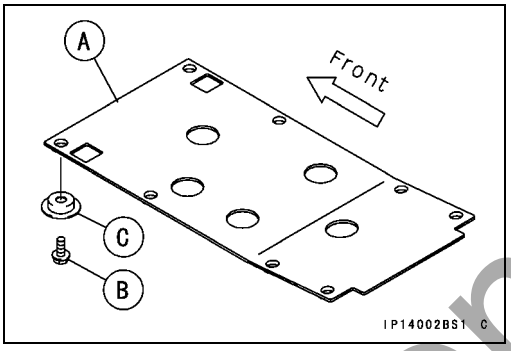
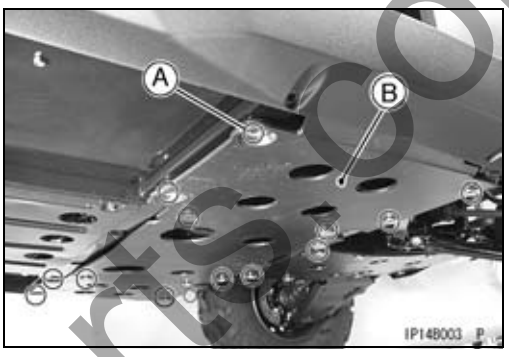
Guards

Front Bottom Guard Installation



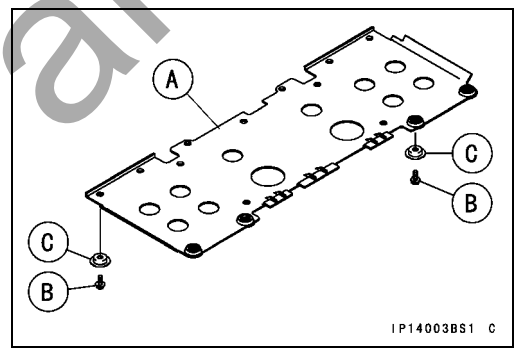
- Install:
  Front Bottom Guard [A]
  Bottom Guard Bolts [B] and Collars [C]

Middle Bottom Guard Removal



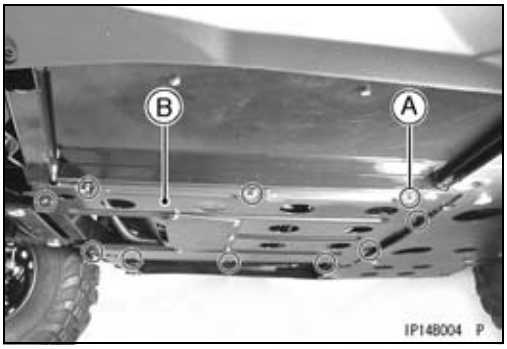
- Remove:
  Bottom Guard Bolts [A] and Collars
  Middle Bottom Guard [B]

Middle Bottom Guard Installation



- Install:
  Middle Bottom Guard [A]
  Bottom Guard Bolts [B] and Collars [C]

Engine Bottom Guard Removal



- Remove:
  Bottom Guard Bolts [A]
  Engine Bottom Guard [B]

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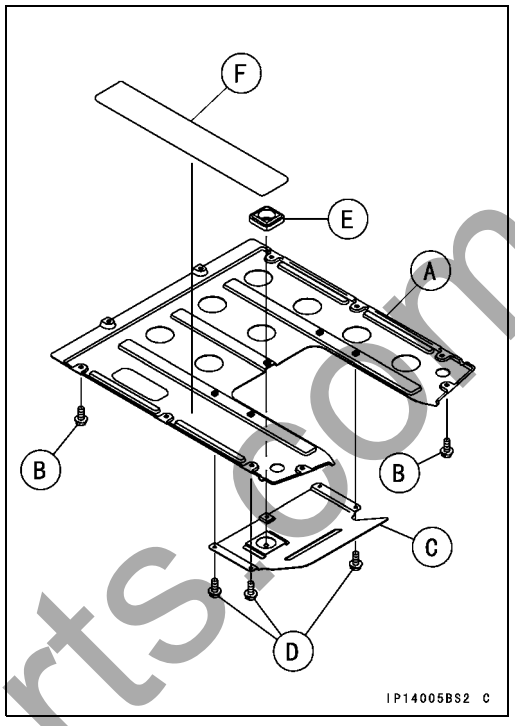
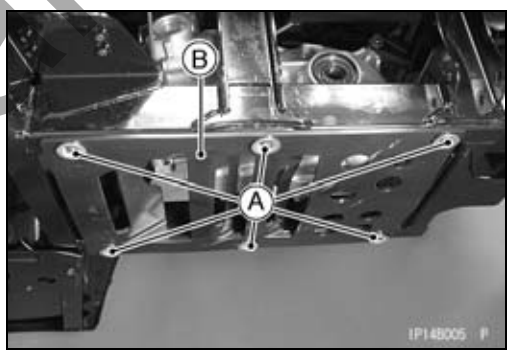
Guards

Engine Bottom Guard Installation



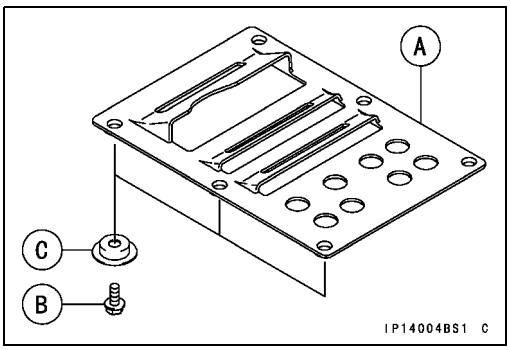
- Install:
  Engine Bottom Guard [A]
  Bottom Guard Bolts [B]
- When installing the following parts, install them as shown in the figure.
  Guard [C]
  Bottom Guard Bolts [D]
  Damper [E]
  Insulator [F]

Rear Bottom Guard Removal



- Remove:
  Bottom Guard Bolts [A] and Collars
  Rear Bottom Guard [B]

Rear Bottom Guard Installation



- Install:
  Rear Bottom Guard [A]
  Bottom Guard Bolts [B] and Collars [C]

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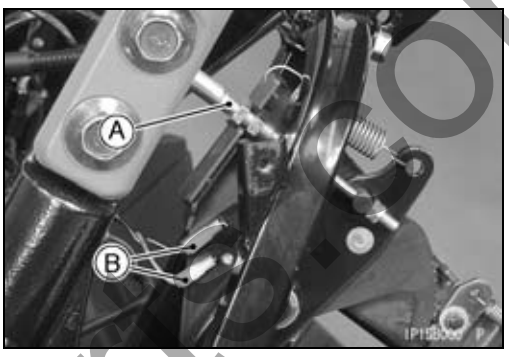
Floorboard

Floorboard Removal

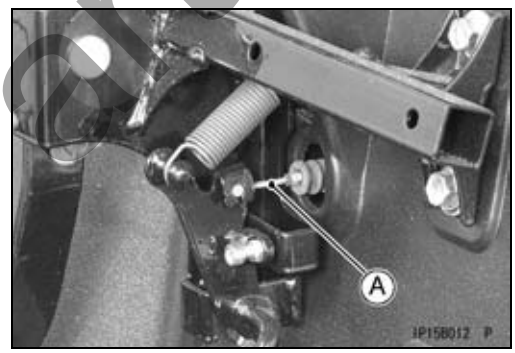
Left Floorboard

- Remove:
  Control Panel (see Control Panel Removal)
  Steering Shafts (see Steering Shafts Removal in the Steering chapter)
  Seat Lower Cover (see Seat Lower Cover Removal)
  Front Brake Master Cylinder (see Front Brake Master Cylinder Removal in the Brakes chapter)

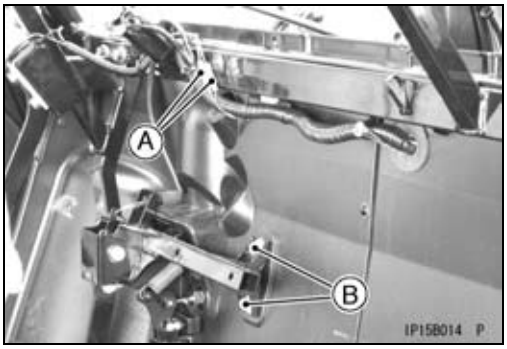
- Remove:
  Parking Brake Cable [A]
  Parking Brake Light Switch Lead Connectors [B]



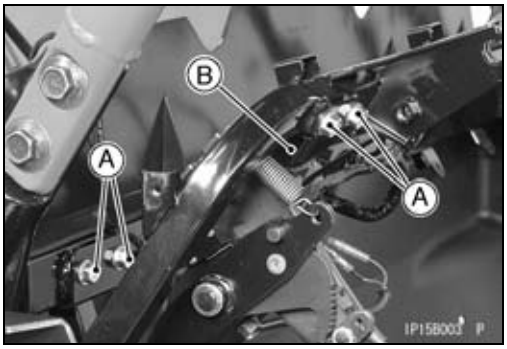
- Remove:
  Throttle Cable [A]



- Remove:
  Brake Light Switch Lead Connectors [A]
  Brake Pedal Bracket Mounting Bolts [B]



- Remove:
  Brake Pedal Bracket Mounting Bolts [A]
  Brake Pedal Bracket [B]



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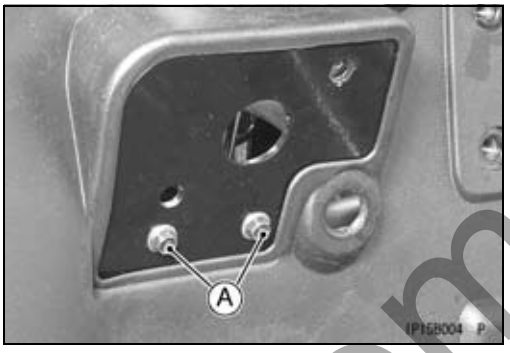
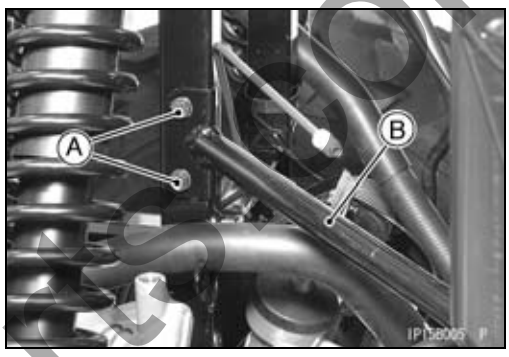
Floorboard

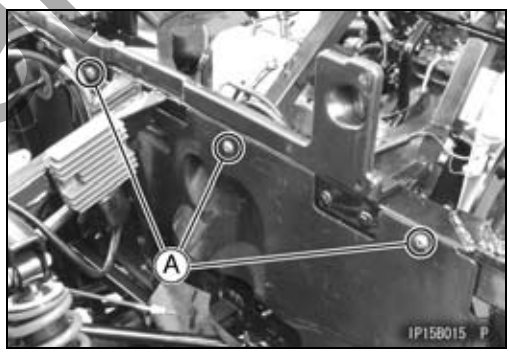
- Remove:
  Plate Bolts [A] and Washers



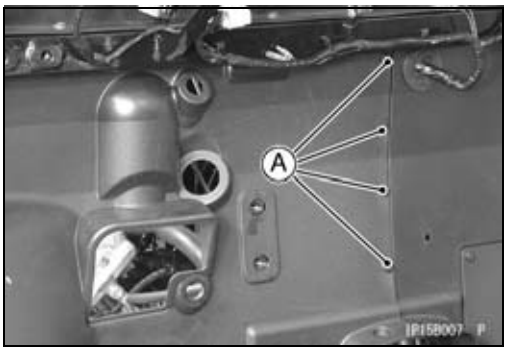
- Remove:
  Bracket Bolts [A]
  Bracket [B] and Plate



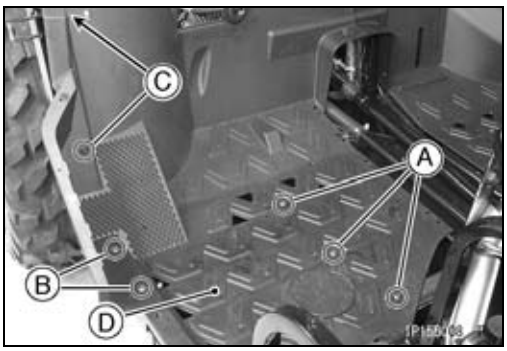
- Remove:
  Tapping Screws [A] and Collars



- Remove:
  Screws [A] and Collars



- Remove:
  Tapping Screws [A] and Collars
  Screws [B] and Collars
  Quick Rivets [C]
  Left Floorboard [D]



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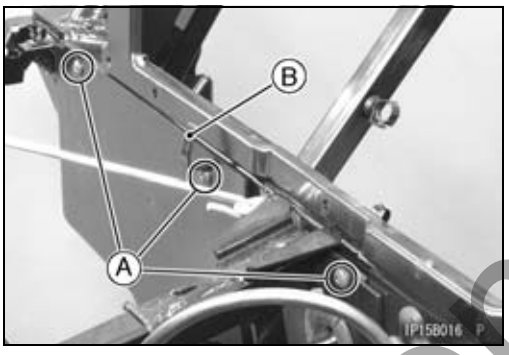
* * * MILITARY USE ONLY * * *

Floorboard

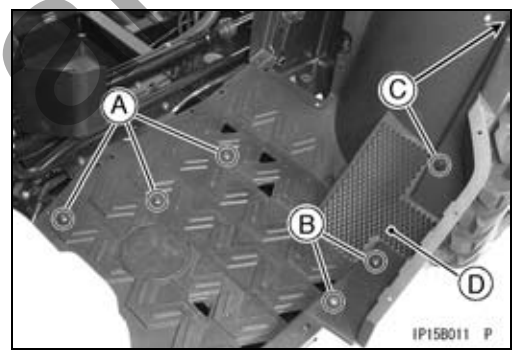
Right Floorboard

● Remove:
Left Floorboard
Coolant Reserve Tank (see Coolant Change in the Cooling System chapter)
Tapping Screws [A] and Collars
Clamp [B]



● Remove:
Grommet [A]

● Remove:
Tapping Screws [A] and Collars
Screws [B] and Collars
Quick Rivets [C]
Right Floorboard [D]



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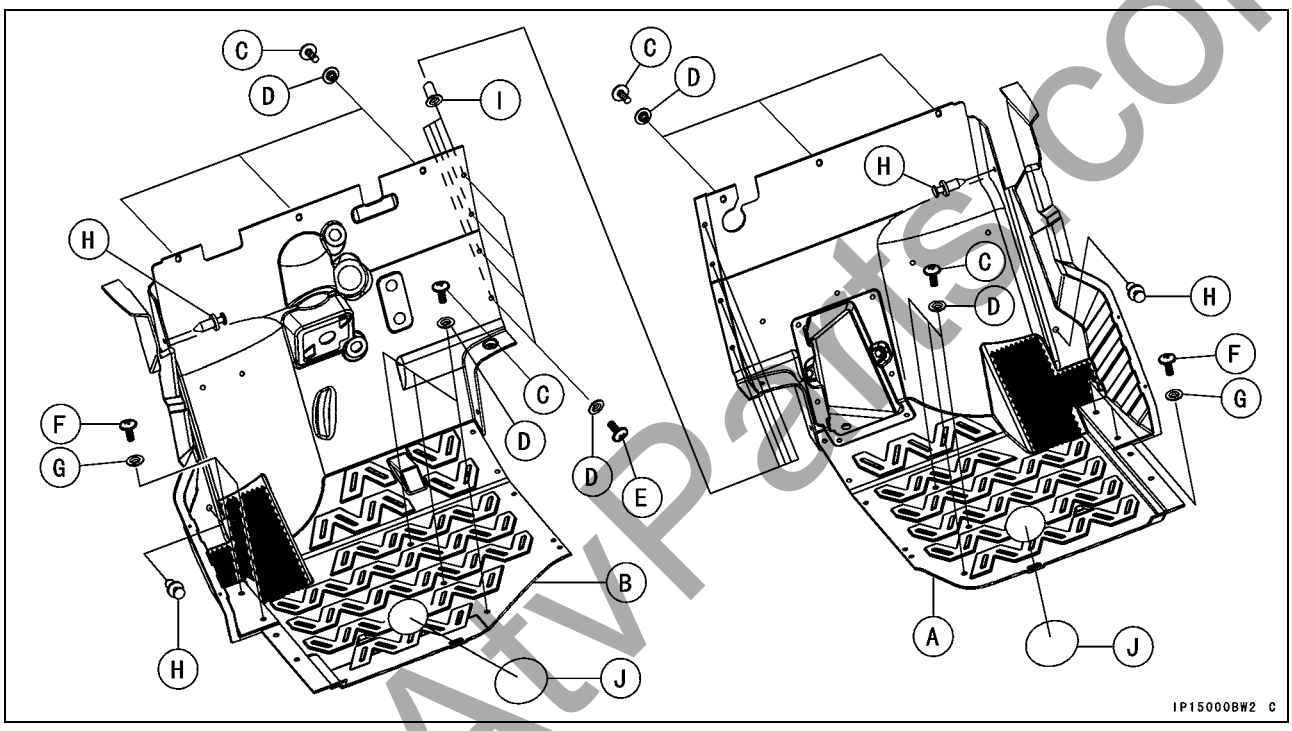
* * * MILITARY USE ONLY * * *

Floorboard

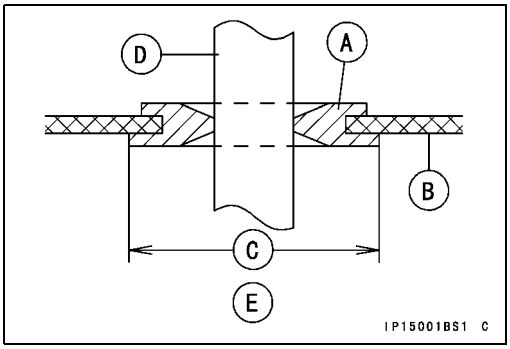
Floorboard Installation

● Install:
Right Floorboard [A]
Left Floorboard [B]
Tapping Screws [C] and Collars [D]: L = 4 mm (0.16 in.)
Screws [E] and Collars [D]: L = 4 mm (0.16 in.)
Screws [F] and Collars [G]: L = 7.2 mm (0.28 in.)
Quick Rivets [H]
Well Nuts [I]
Caps [J]



● Install:
Coolant Reserve Tank (see Coolant Change in the Cooling System chapter)

● Install the grommet [A] to the right floorboard [B] so that the large diameter [C] side faces forward.
Harness [D]
Front Side [E]



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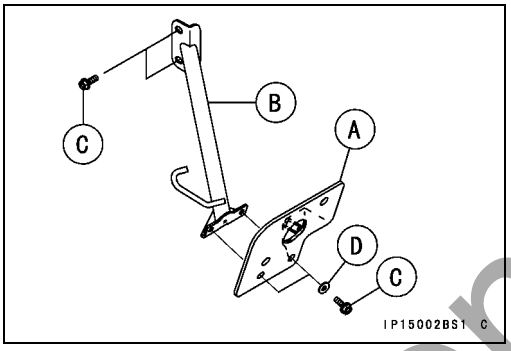
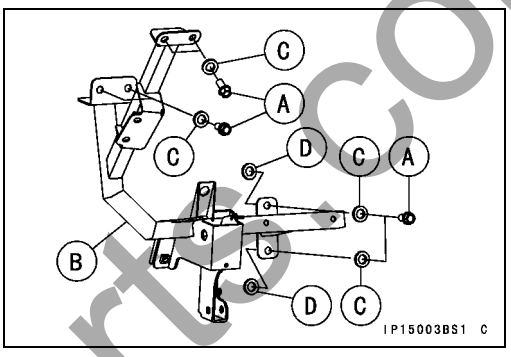
Floorboard

- Apply sealing material to the mating surface of the floorboard and plate [A].
- Install:
  Plate
  Bracket [B]
  Bolts [C]: M6, L = 18 mm (0.71 in.)
  Washers [D]: Outside Diameter 15 mm (0.59 in.)



- Apply a non-permanent locking agent to the brake pedal bracket mounting bolts [A].
- Install:
  Brake Pedal Bracket [B]
  Washers [C]: Thickness 1.6 mm (0.063 in.)
  Washers [D]: Thickness 3.2 mm (0.126 in.)
- Tighten:

Torque - Brake Pedal Bracket Mounting Bolts: 34.3 N·m (3.5 kgf·m, 25 ft·lb)



- Install:
  Throttle Cable (see Throttle Cable Installation in the Fuel System chapter)
  Parking Brake Cable (see Parking Brake Cable Installation in the Brakes chapter)
  Parking Brake Light Switch Lead Connectors
  Front Brake Master Cylinder (see Front Brake Master Cylinder Installation in the Brakes chapter)
  Steering Shafts (see Steering Shafts Installation in the Steering chapter)
  Control Panel (see Control Panel Installation)
  Seat Lower Cover (see Seat Lower Cover Installation)

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Electrical System

Table of Contents

Parts Location 16-3
Exploded View 16-6
Specifications 16-12
Special Tools 16-13
Wiring Diagram 16-14
Precautions 16-16
Electrical Wiring 16-17
  Wiring Inspection 16-17
Battery 16-18
  Battery Removal 16-18
  Battery Installation 16-18
  Battery Activation (CA Model) 16-21
  Precautions 16-23
  Interchange 16-23
  Charging Condition Inspection 16-24
  Refreshing Charge 16-24
Charging System 16-27
  Alternator Cover Removal 16-27
  Alternator Cover Installation 16-28
  Alternator Rotor Removal 16-30
  Alternator Rotor Installation 16-30
  Alternator Stator Removal 16-31
  Alternator Stator Installation 16-31
  Regulator/Rectifier Output Voltage Inspection 16-31
  Alternator Inspection 16-32
  Regulator/Rectifier Removal 16-33
  Regulator/Rectifier Installation 16-33
  Regulator/Rectifier Inspection 16-34
Ignition System 16-36
  Spark Plug Removal 16-36
  Spark Plug Installation 16-36
  Spark Plug Cleaning/Inspection 16-36
  Spark Plug Gap Inspection 16-36
  Ignition Coil Removal 16-36
  Ignition Coil Installation 16-37
  Ignition Coil Inspection 16-38
  Ignition Coil Primary Peak Voltage Inspection 16-39
  Crankshaft Sensor Removal 16-39
  Crankshaft Sensor Installation 16-40
  Crankshaft Sensor Inspection 16-40
  Crankshaft Sensor Peak Voltage Inspection 16-40
  Alternator Rotor Inspection 16-41
  Ignition Timing Test 16-41
Electric Starter System 16-44
  Starter Motor Removal 16-44
  Starter Motor Installation 16-44
  Starter Motor Disassembly 16-45
  Starter Motor Assembly 16-46
  Brush Inspection 16-48
  Commutator Cleaning and Inspection 16-48
  Armature Inspection 16-48
  Brush Lead Inspection 16-49
  Right-hand End Cover Inspection 16-49
  Starter Relay Inspection 16-49
  Starter Relay Installation 16-49
  Starter Control Relay Inspection .. 16-49
  Starter Motor Clutch Removal 16-50
  Starter Motor Clutch Installation ... 16-51
  Starter Motor Clutch Inspection ... 16-51
  Torque Limiter Inspection 16-51
Lighting System 16-52
  Headlight Beam Vertical Adjustment 16-52
  Headlight Bulb Replacement 16-52
  Tail/Brake Light Bulb Replacement 16-53
Radiator Fan System 16-56
  Radiator Fan Circuit Inspection 16-56
  Radiator Fan Motor Inspection 16-56
  Radiator Fan Breaker Inspection . 16-56
  Radiator Fan Breaker Installation 16-57
  Radiator Fan Relay Inspection 16-57
Meter 16-58
  Multifunction Meter Unit Removal 16-58
  Multifunction Meter Unit Installation 16-58
  Multifunction Meter Unit Inspection 16-59
Actuator Control System 16-67
  Engine Brake Actuator Removal .. 16-67
  Engine Brake Actuator Installation 16-67
  Actuator Control System Outline .. 16-68
  Engine Brake Actuator Inspection 16-68
  Speed Sensor Circuit Inspection .. 16-69
  Controller Unit Inspection 16-70
  Forward/Reverse Detecting Sensor Inspection 16-71
2WD/4WD Solenoid Valve 16-73
  2WD/4WD Solenoid Valve Inspection 16-73
Relay 16-75
  Relay Inspection 16-75
Switches and Sensor 16-76
  Brake Light Switch Adjustment 16-76

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Water Temperature Switch Inspection 16-76
Fuel Level Sensor Inspection..... 16-76
Speed Sensor Removal/Installation 16-76
Speed Sensor Inspection..... 16-77
Switch Inspection 16-77
Fuses 16-79
Fuse Removal..... 16-79
Fuse Installation..... 16-79
Fuse Inspection..... 16-80

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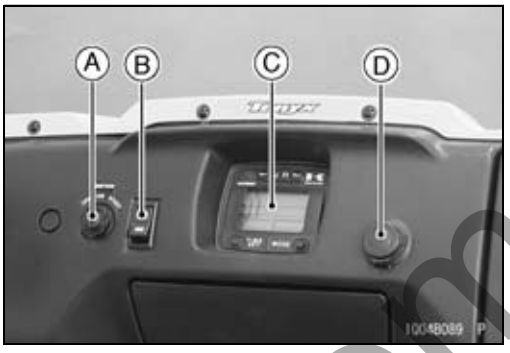
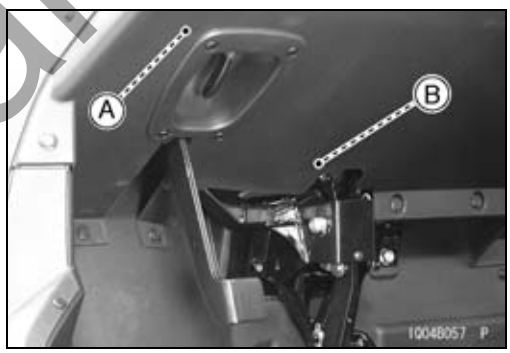
Parts Location

Ignition Switch [A]
2WD/4WD Shift Switch [B]
Multifunction Meter [C]
Accessory Connector (12 V 120 W) (Power Outlet) [D]

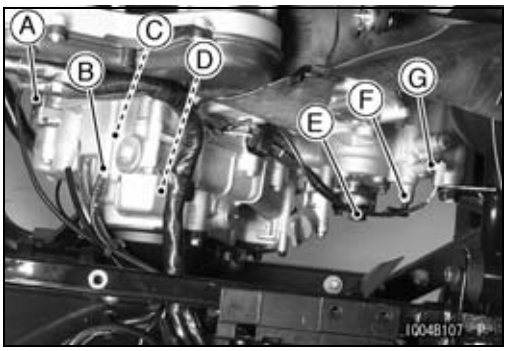


Lighting Switch [A]

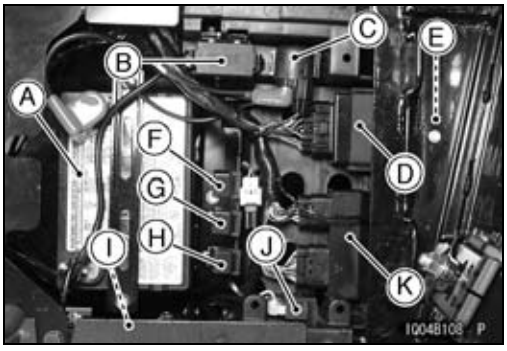
Parking Brake Position Switch [A]
Brake Light Switch [B]



Starter Motor [A]
Engine Ground [B]
Crankshaft Sensor [C]
Alternator [D]
Forward/Reverse Detecting Sensor [E]
Reverse Position Switch [F]
Neutral Position Switch [G]



Battery [A]
Fuse Box [B]
Starter Relay [C]
Actuator Controller [D]
Vehicle-down Sensor [E]
Starter Control Relay [F]
Radiator Fan Relay [G]
Fuel Pump Relay [H]
Frame Ground 1 [I]
Radiator Fan Breaker [J]
ECU (Electronic Control Unit) [K]



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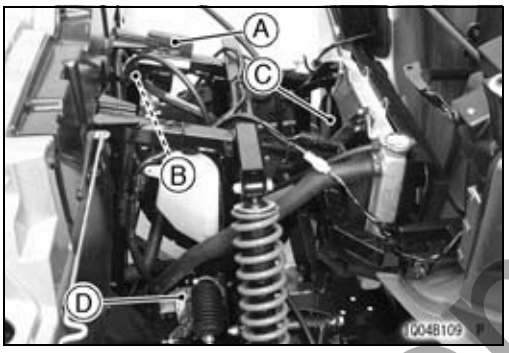
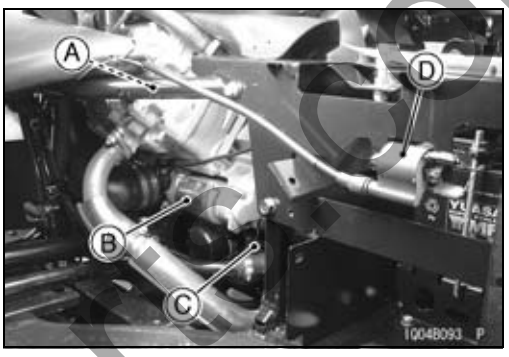
Parts Location

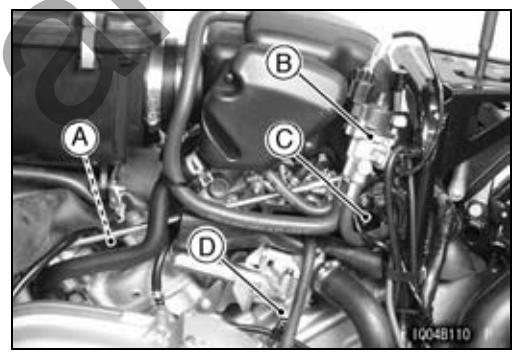
Regulator/Rectifier [A]
Frame Ground 2 [B]
Radiator Fan [C]
4WD Position Switch [D]



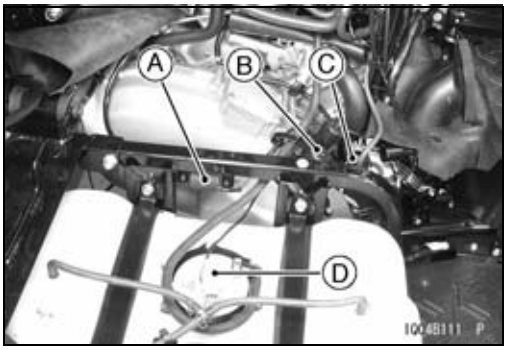
Spark Plug (Front Cylinder) [A]
Starter Motor [B]
Oil Pressure Switch [C]
Ignition Coil #1 (Front Cylinder) [D]



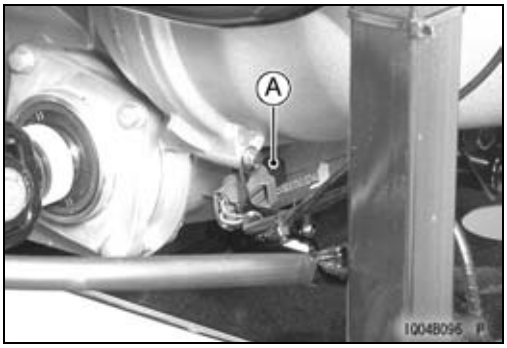
Spark Plug (Rear Cylinder) [A]
ISC Valve [B]
Throttle Sensor [C]
Water Temperature Sensor [D]



Ignition Coil #2 (Rear Cylinder) [A]
Engine Brake Actuator [B]
2WD/4WD Solenoid Valve [C]
Fuel Pump and Fuel Level Sensor [D]



Speed Sensor [A]



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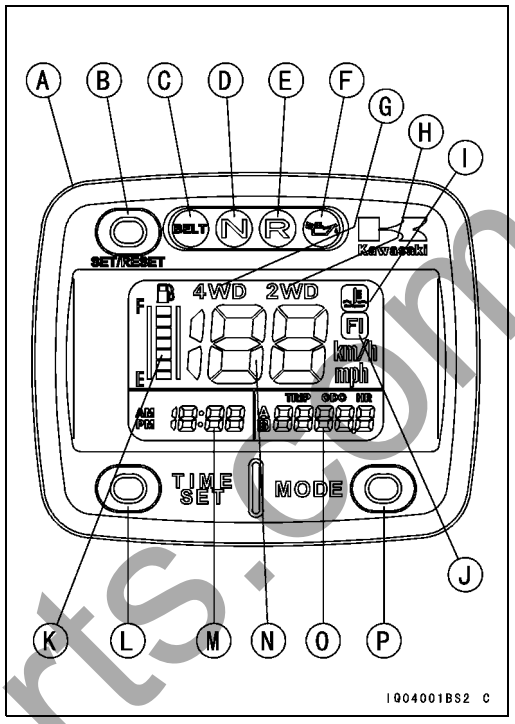
Parts Location

Multifunction Meter [A]
“SET/RESET” Button [B]
Belt Check Indicator Light [C]
Neutral Indicator Light [D]
Reverse Indicator Light [E]
Oil Pressure Warning Indicator Light [F]
“4WD” Indicator Symbol [G]
“2WD” Indicator Symbol [H]
Water Temperature Warning Symbol [I]
FI Indicator Symbol [J]
Fuel Level Gauge [K]
“TIME SET” Button [L]
Clock [M]
Speedometer/“P” Parking Brake Symbol [N]
Trip Meter/Odometer/Hour Meter [O]
“MODE” Button [P]



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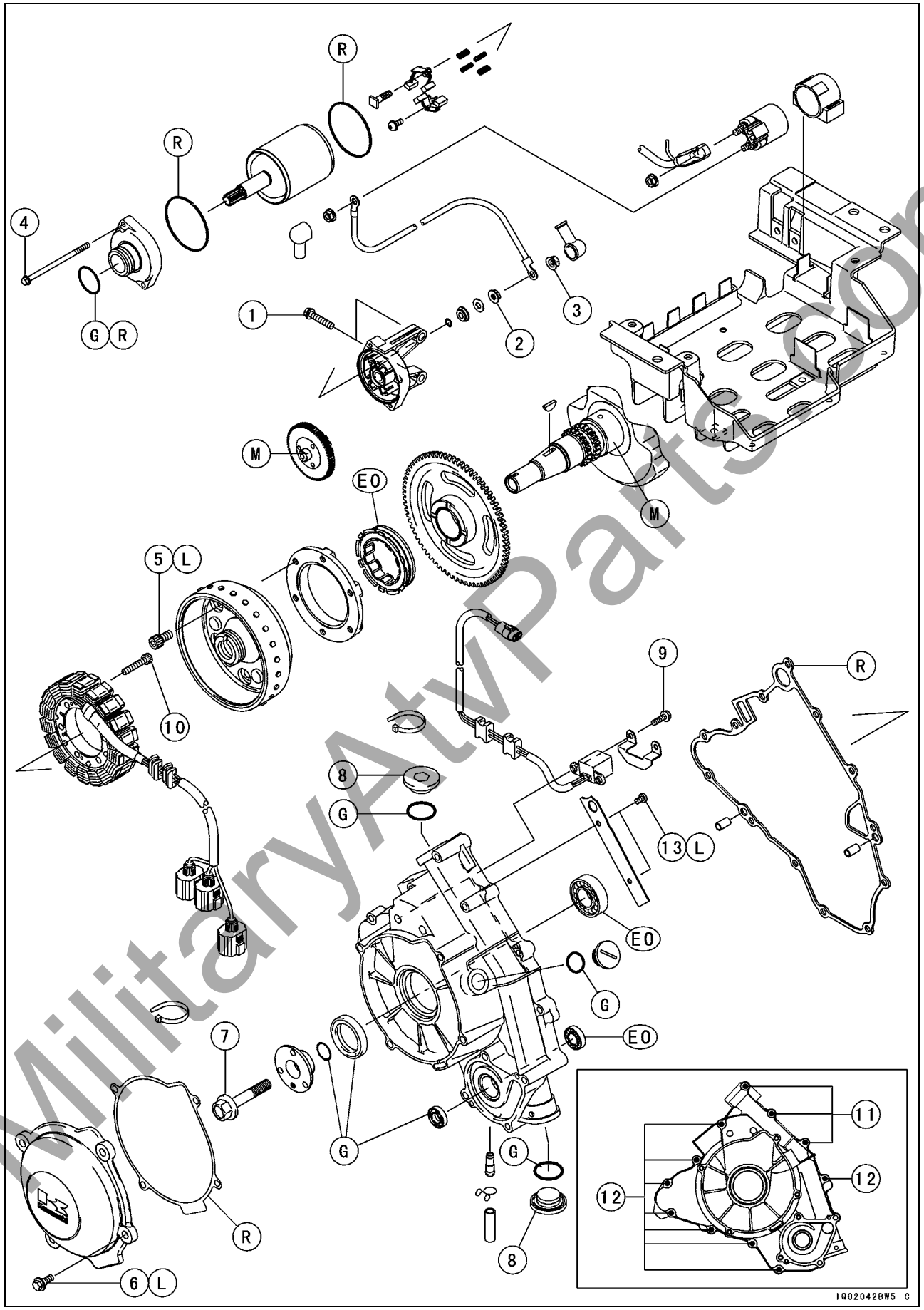
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Starter Motor Mounting Bolts	8.8	0.90	78 in·lb	
2	Starter Motor Terminal Locknut	11	1.1	97 in·lb	
3	Starter Motor Cable Mounting Nut	6.8	0.69	60 in·lb	
4	Starter Motor Through Bolts	5.0	0.51	44 in·lb	
5	Starter Motor Clutch Bolts	34	3.5	25	L
6	Left Engine Cover Bolts	5.9	0.60	52 in·lb	L
7	Alternator Rotor Bolt	127	13.0	94	
8	Alternator Cover Plugs	17.5	1.8	13	
9	Crankshaft Sensor Mounting Bolts	5.9	0.60	52 in·lb	
10	Alternator Stator Bolts	13.5	1.4	10	
11	Alternator Cover Bolts, L = 55 mm (2.17 in.)	8.8	0.90	78 in·lb	
12	Alternator Cover Bolts, L = 30 mm (1.18 in.)	8.8	0.90	78 in·lb	
13	Breather Plate Screws	2.9	0.30	26 in·lb	L

EO: Apply engine oil.
G: Apply grease.
L: Apply a non-permanent locking agent.
M: Apply molybdenum dislfide grease.
R: Replacement Parts

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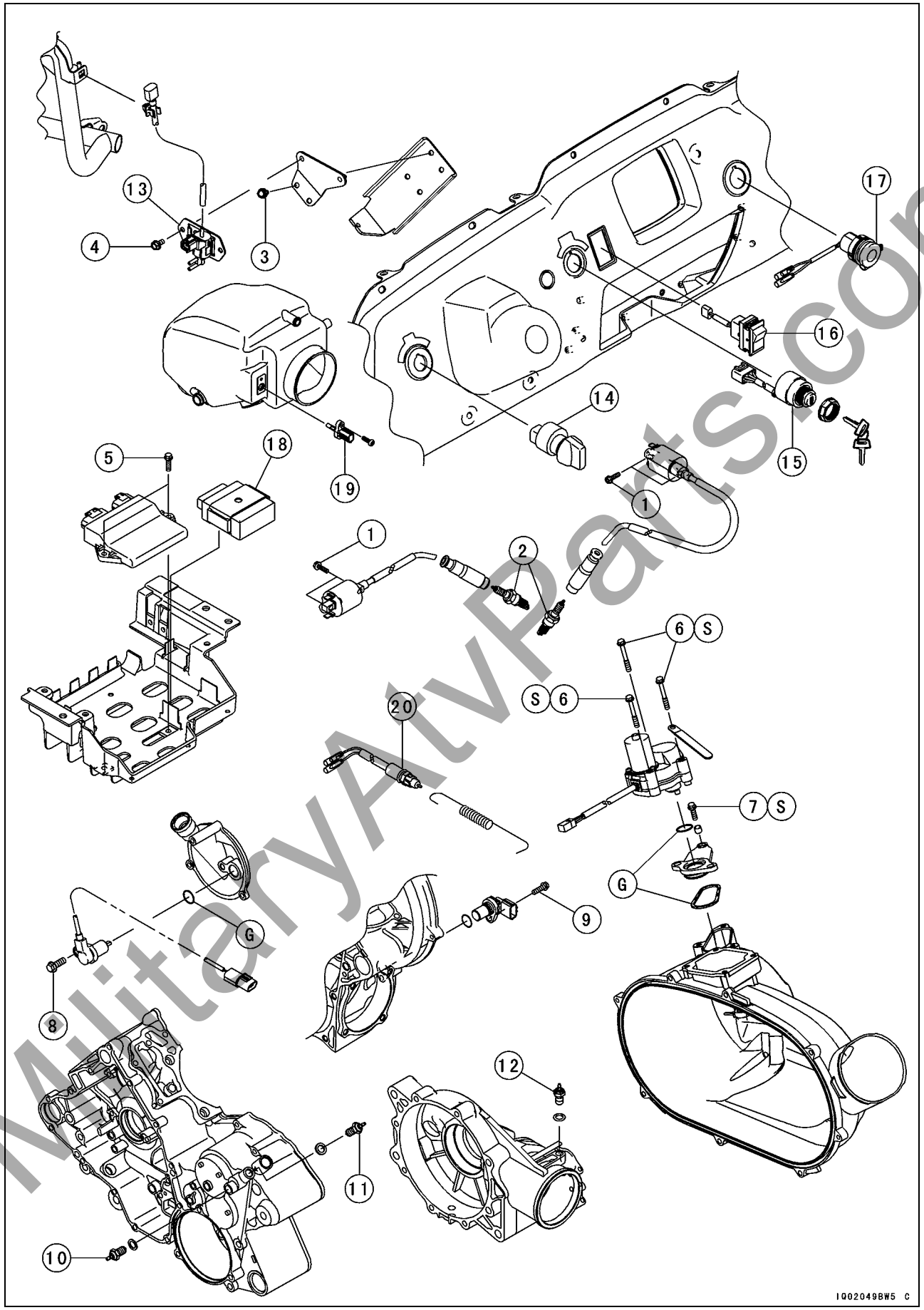
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Ignition Coil Mounting Bolts	5.9	0.60	52 in·lb	
2	Spark Plugs	13	1.3	115 in·lb	
3	Vacuum Actuator Bracket Bolts	8.8	0.90	78 in·lb	
4	Solenoid Valve Bracket Bolts	8.8	0.90	78 in·lb	
5	ECU Mounting Bolts	6.9	0.70	61 in·lb	
6	Engine Brake Actuator Mounting Bolts	8.8	0.90	78 in·lb	S
7	Engine Brake Actuator Cover Bolt	8.8	0.90	78 in·lb	S
8	Forward/Reverse Detecting Sensor Mounting Bolt	14.9	1.5	11	
9	Speed Sensor Mounting Bolt	8.8	0.90	78 in·lb	
10	Reverse Position Switch	15	1.5	11	
11	Neutral Position Switch	15	1.5	11	
12	4WD Position Switch	15	1.5	11	

13. 2WD/4WD Solenoid Valve
14. Lighting Switch
15. Ignition Switch
16. 2WD/4WD Shift Switch
17. Accessory Connector (12 V 120 W) (Power Outlet)
18. Actuator Controller
19. Air Temperature Sensor
20. Brake Light Switch

G: Apply grease.
S: Follow the specific tightening sequence.

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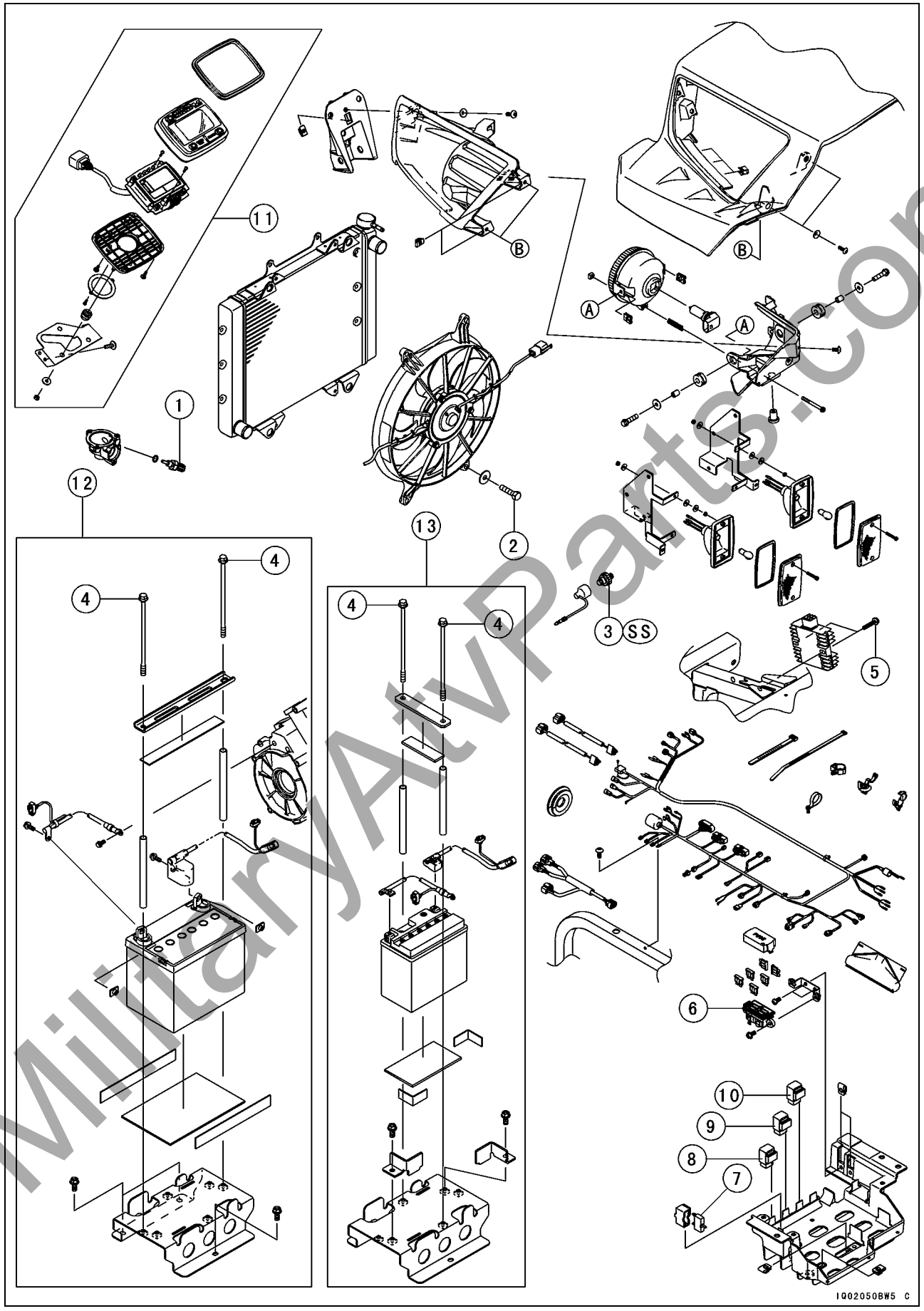
Exploded View



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Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Temperature Sensor	12	1.2	106 in·lb	
2	Radiator Fan Assembly Bolts	8.3	0.85	73 in·lb	
3	Oil Pressure Switch	15	1.5	11	SS
4	Battery Holder Mounting Bolts	16	1.6	12	
5	Regulator/Rectifier Mounting Bolts	8.8	0.90	78 in·lb	

6. Fuse Box
7. Radiator Fan Breaker 12 A
8. Fuse Pump Relay
9. Radiator Fan Relay
10. Starter Control Relay
11. Multifunction Meter
12. US Model
13. CA Model

SS: Apply silicone sealant (Liquid Gasket, TB1211: 56019-120).

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Specifications

Item	Standard	Service Limit
Battery		
Type	Sealed Battery	– – –
Model Name	KMX14-BS (CA Model)	– – –
Capacity	12 V 12 Ah (CA Model) 12 V 14 Ah (US Model)	– – – – – –
Charging System		
Alternator Type	Three-phase AC	– – –
Charging Voltage	14 ~ 15 V	– – –
(Regulator/Rectifier Output Voltage)		
Alternator Output Voltage	52 ~ 78 V at 4 000 r/min (rpm)	– – –
Stator Coil Resistance	0.24 ~ 0.36 Ω	– – –
Ignition System		
Spark Plug:		
Spark Plug Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in.)	– – –
Spark Plug Cap Resistance	3.75 ~ 6.25 kΩ	– – –
Ignition Coil:		
3 Needle Arcing Distance	7 mm (0.28 in.) or more	– – –
Primary Winding Resistance	1.84 ~ 2.76 Ω	– – –
Secondary Winding Resistance	10.4 ~ 15.6 kΩ	– – –
Primary Peak Voltage	160 V or more	– – –
Crankshaft Sensor Resistance	110 ~ 140 Ω	– – –
Crankshaft Sensor Peak Voltage	2 V or more	– – –
Electric Starter System		
Starter Motor:		
Brush Length	12 mm (0.47 in.)	6.5 mm (0.26 in.)
Fuel Level Sensor		
Fuel Level Sensor Resistance:		
Full Level Position	10 Ω	– – –
Empty Level Position	120 Ω	– – –
Actuator Control System		
Actuator Resistance	3 ~ 15 Ω (between R and BK leads) 3.5 ~ 6.5 kΩ (between O and BL leads) 630 ~ 5 330 Ω (between Y and BL leads)	– – –
Forward/Reverse Detecting Sensor Resistance	1.2 ~ 1.6 kΩ	– – –
2WD/4WD Solenoid Valve		
Solenoid Valve Resistance	37 ~ 43 Ω at 20°C (68°F)	– – –
Switches		
Brake Light Switch Timing	ON after 10 mm (0.4 in.) of pedal travel	– – –
Water Temperature Sensor Resistance	*18.80 ±2.37 kΩ at –20°C (–4°F)	– – –
	*about 6.544 kΩ at 0°C (32°F)	– – –
	1.136 ±0.095 kΩ at 40°C (104°F)	– – –
	0.1553 ±0.0070 kΩ at 100°C (212°F)	– – –
	*: Reference Information	

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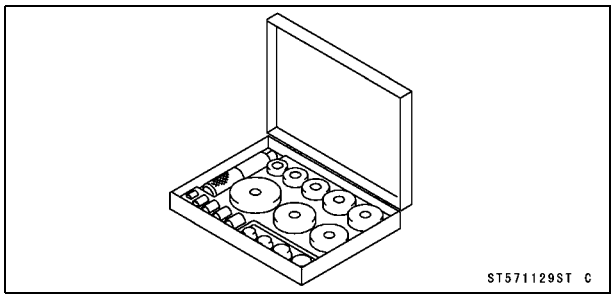
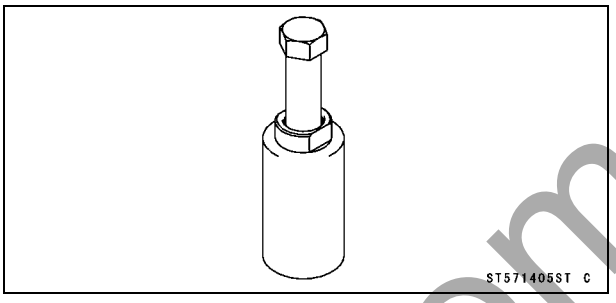
Special Tools

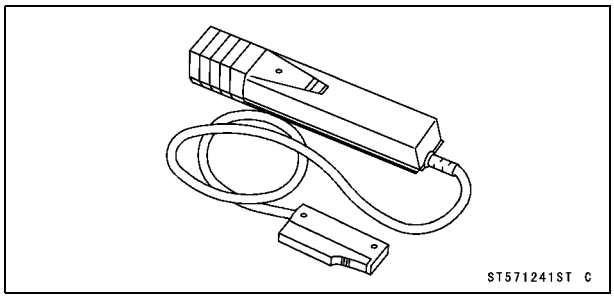
Bearing Driver Set:
57001-1129



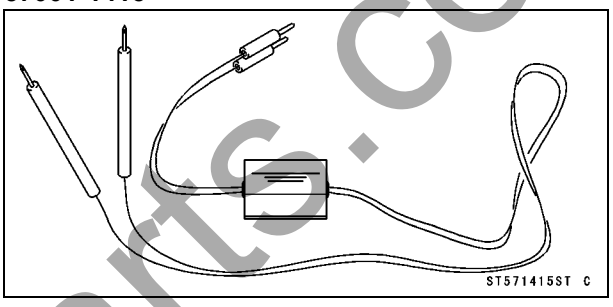
Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5:
57001-1405



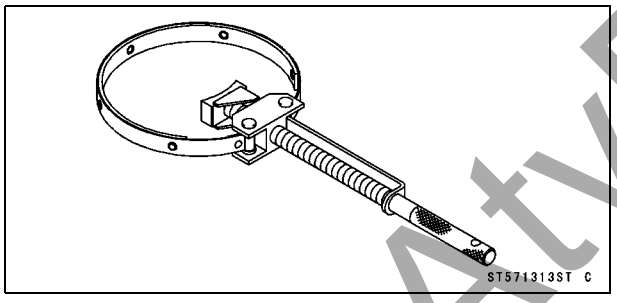
Timing Light:
57001-1241



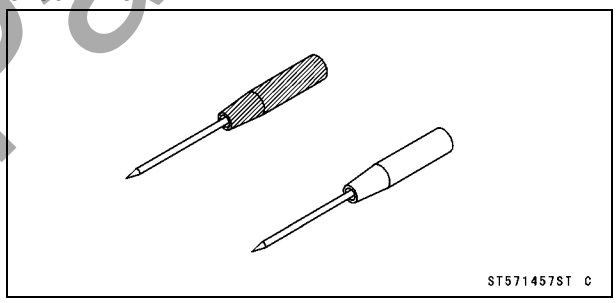
Peak Voltage Adapter:
57001-1415



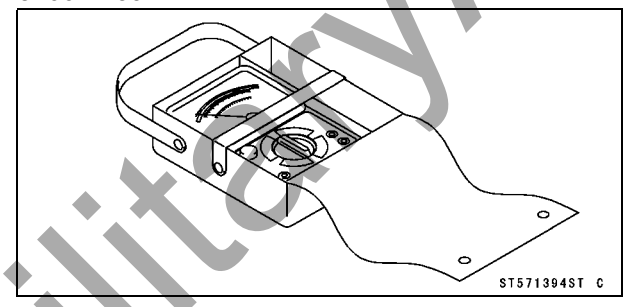
Flywheel Holder:
57001-1313



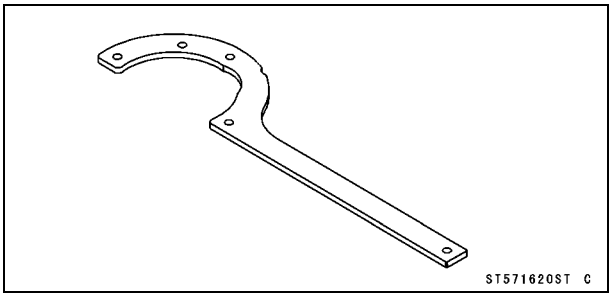
Needle Adapter Set:
57001-1457



Hand Tester:
57001-1394



Drive Pulley Holder:
57001-1620



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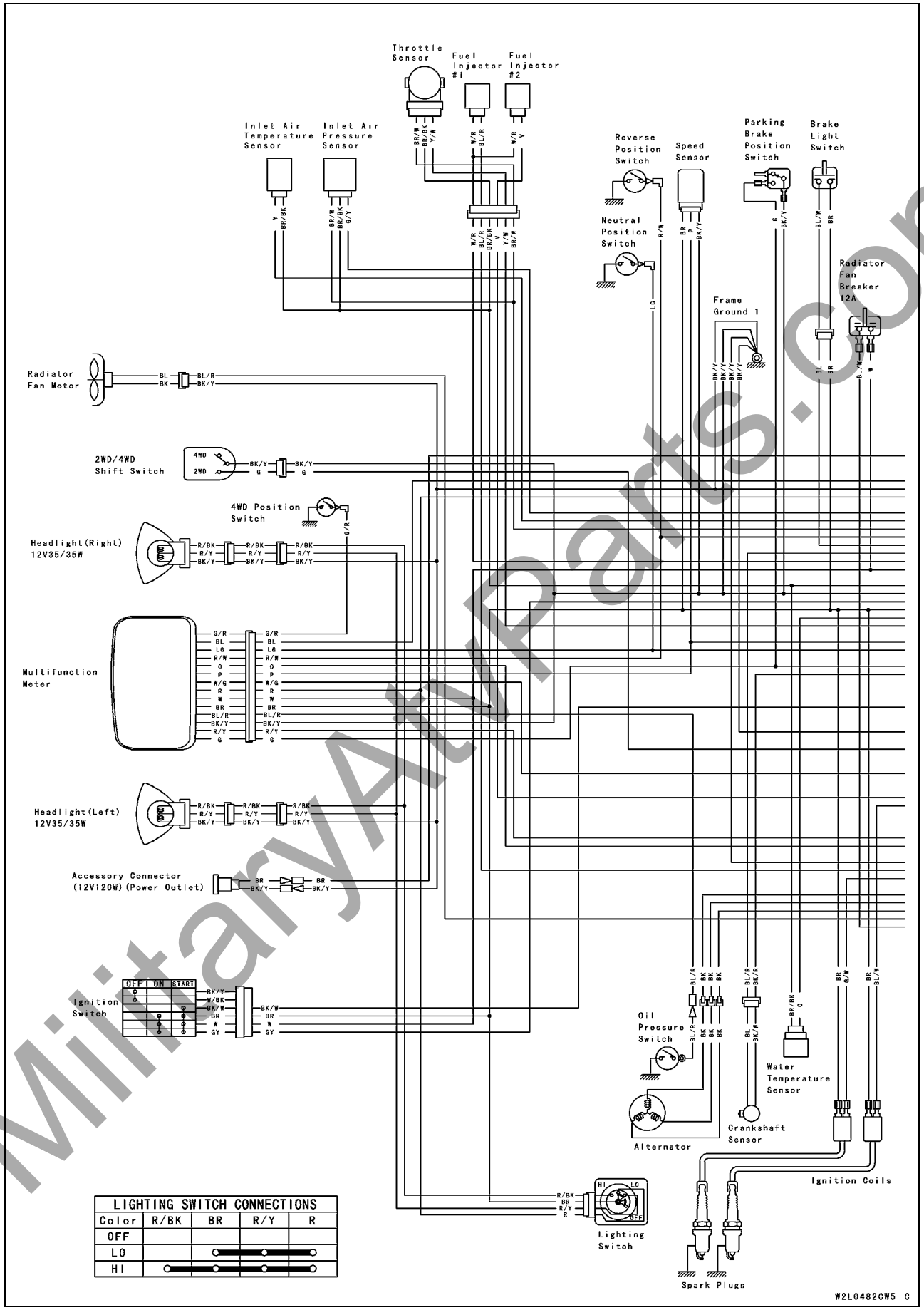
Wiring Diagram



LIGHTING SWITCH CONNECTIONS				
Color	R/BK	BR	R/Y	R
OFF				
LO		○	○	○
HI	○	○	○	○

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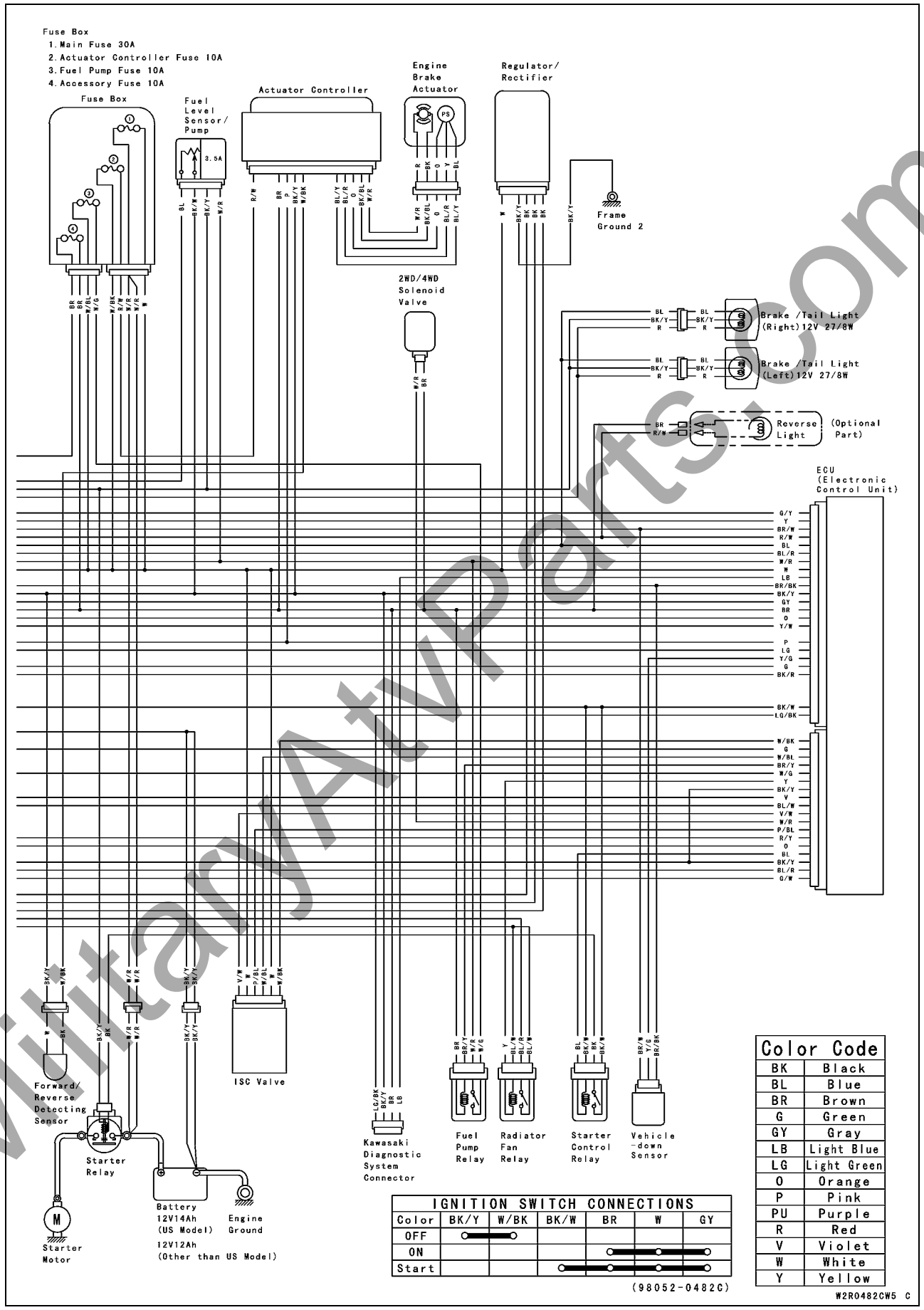
Wiring Diagram



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Precautions

There are a number of important precautions that should be taken when servicing electrical systems. Learn and observe all the rules below.

- ○Do not reverse the battery lead connections. This will burn out the diodes in the electrical parts.
- ○Always check battery condition before condemning other parts of an electrical system. A fully charged battery is required for conducting accurate electrical system tests.
- ○The electrical parts should never be struck sharply, as with a hammer, or allowed to fall on a hard surface. Such a shock to the parts can damage them.
- ○To prevent damaging electrical parts, do not disconnect the battery leads or any other electrical connections when the ignition switch is on, or while the engine is running.
- ○Because of the high current, never keep the ignition switch key turned “START” position when the starter motor will not turn over, or the current may burn out the starter motor windings.
- ○Take care not to short the leads that are directly connected to the battery positive (+) terminal to chassis ground.
- ○Troubles may involve one or in some cases all items. Never replace a defective part without determining what CAUSED the failure. If the failure was caused by some other item or items, they too must be repaired or replaced, or the new replacement will soon fail again.
- ○Make sure all connectors in the circuit are clean and tight, and examine wires for signs of burning, fraying, etc. Defective wires and bad connections will affect electrical system operation.
- ○Measure coil and winding resistance when the part is cold (at room temperature).
- ○Color Codes:

BK	Black	GY	Gray	R	Red
BL	Blue	LB	Light blue	V	Violet
BR	Brown	LG	Light green	W	White
CH	Chocolate	O	Orange	Y	Yellow
DG	Dark green	P	Pink		
G	Green	PU	Purple		

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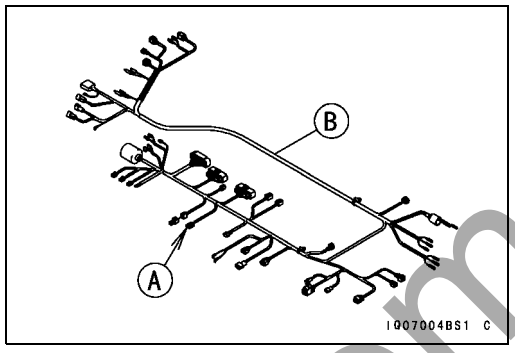
Electrical Wiring

Wiring Inspection



- Visually inspect the wiring for signs of burning, fraying, etc.

★If any wiring is defective, replace the damaged wiring.

- Pull each connector [A] apart and inspect for corrosion, dirt, and damage.

★If the connector is corroded or dirty, clean it carefully. If it is damaged, replace it.

- Check the wiring for continuity.

○Use the wiring diagram to find the ends of the lead which is suspected of being a problem.

○Connect the hand tester between the ends of the leads.

Special Tool - Hand Tester: 57001-1394

○Set the tester to the ×1 Ω range.

★If the tester does not read 0 Ω, the lead is defective. Replace the lead or the wiring harness [B] if necessary.

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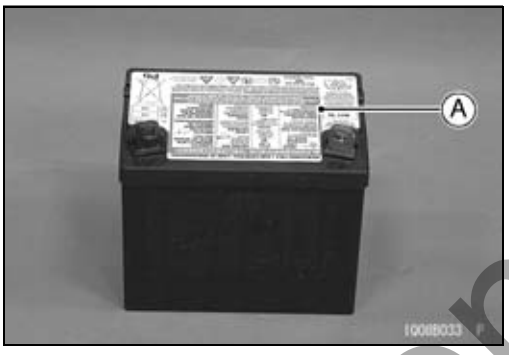
Battery

○In this model, two batteries are prepared.
Pre-charged Sealed Type Battery [A] (US model)

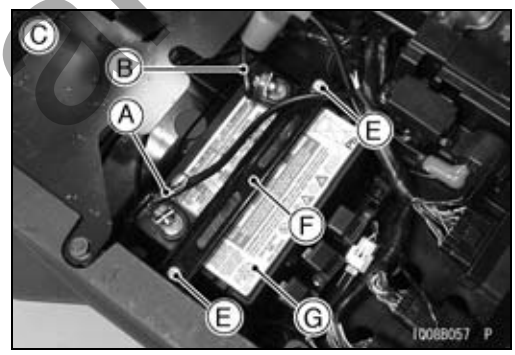


Sealed Type Battery [A] (CA model)

Battery Removal

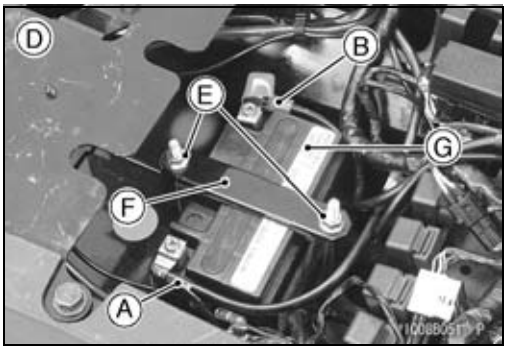
- Turn off the ignition switch.
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
- Disconnect the battery negative (–) cable [A] first, and then the positive (+) cable [B].

NOTICE
Be sure to disconnect the negative (–) cable first.



US Model [C]
CA Model [D]

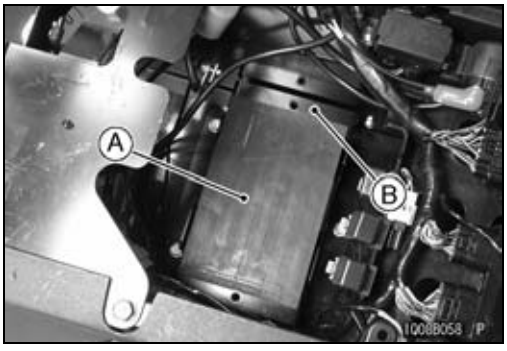
- Remove:
  Battery Holder Mounting Nuts [E]
  Battery Holder [F]
  Battery [G]



Battery Installation

(For US Model)

- Check that the damper [A] on the plate [B] is properly in place.



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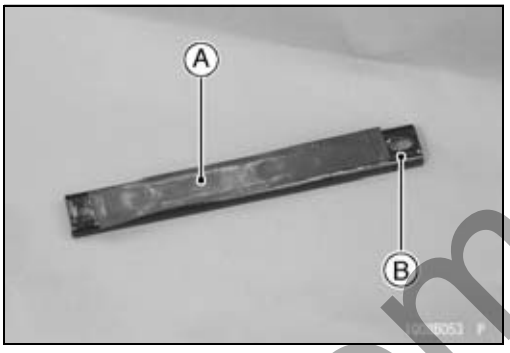
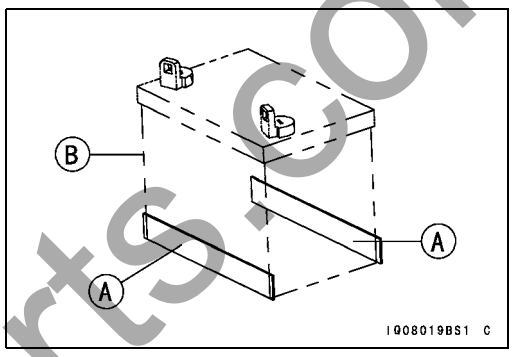
Battery

- Check that the damper [A] on the battery holder [B] is properly in place.



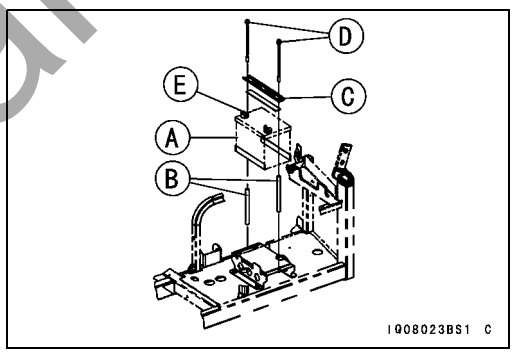
- Check that the dampers [A] on the battery [B] are properly in place.



- Install:
  Battery [A]
  Collars [B]
  Battery Holder [C]
- Tighten:

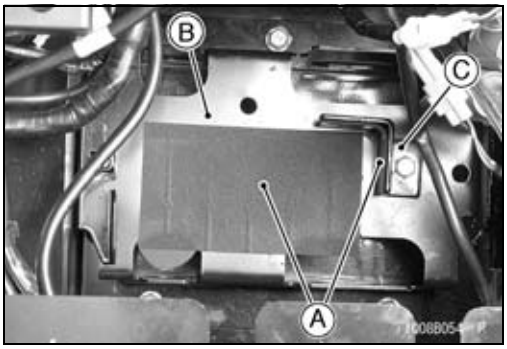
Torque - Battery Holder Mounting Bolts [D]: 16 N·m (1.6 kgf·m, 12 ft·lb)

- Connect the positive (+) cable first, and then negative (–) cable.
  Positive Terminal [E]
- Do not run the positive (+) cable between the left cover and collar (see Cable, Wire, and Hose Routing in the Appendix chapter).
- Put a light coat of grease on the terminals to prevent corrosion.
- Install the terminal cap on the positive terminal.



(For CA Model)

- Check that the dampers [A] on the plate [B] and bracket [C] are properly in place.



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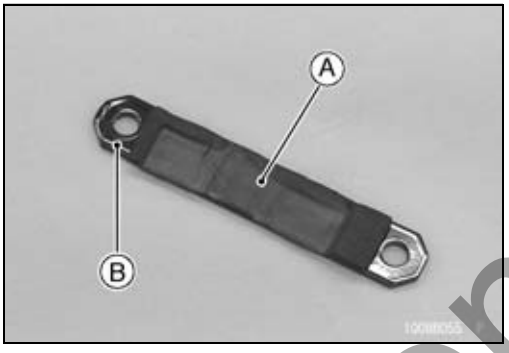
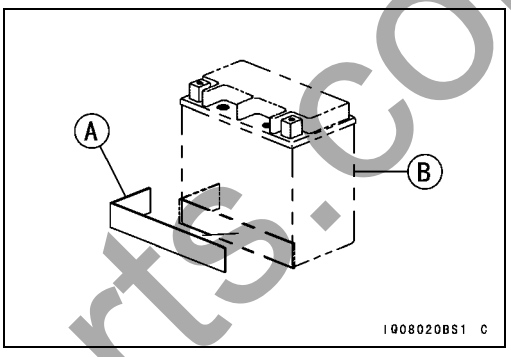
Battery

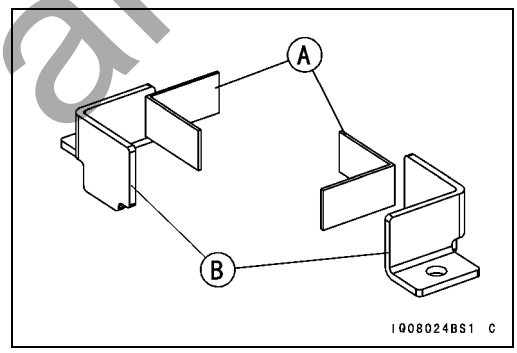
- Check that the damper [A] on the battery holder [B] is properly in place.



- Check that the damper [A] on the battery [B] is properly in place.

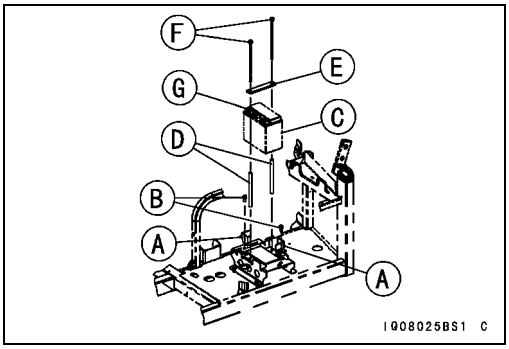


- Check that the damper [A] on the battery bracket [B] is properly in place.



- Install:
  Battery Brackets [A]
  Battery Bracket Mounting Bolts [B]
  Battery [C]
  Collars [D]
  Battery Holder [E]
- Tighten:

  Torque - Battery Holder Mounting Bolts [F]: 16 N·m (1.6 kgf·m, 12 ft·lb)
- Connect the positive (+) cable first, and then negative (–) cable.
  Positive Terminal [G]
- Put a light coat of grease on the terminals to prevent corrosion.
- Install the terminal cap on the positive terminal.



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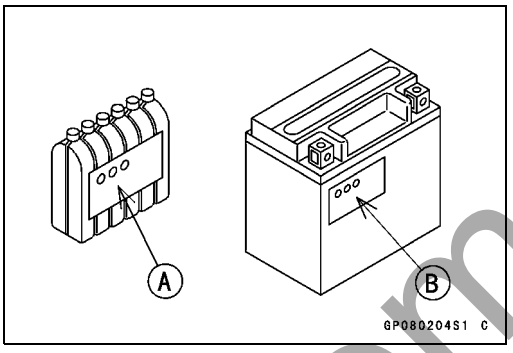
Battery

Battery Activation (CA Model)

Electrolyte Filling

- Make sure that the model name [A] of the electrolyte container matches the model name [B] of the battery. These names must be the same.

Battery Model Name: KMX 14-BS

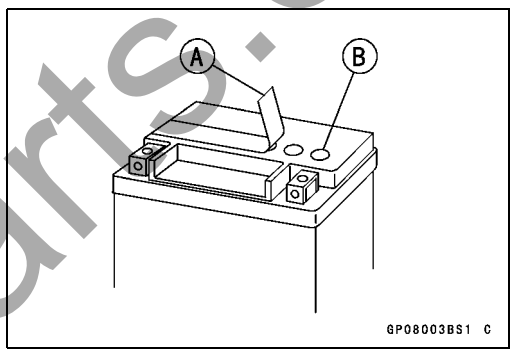


NOTICE

Be sure to use the electrolyte container with the same model name as the battery since the electrolyte volume and specific gravity vary with the battery type. This is to prevent overfilling of the electrolyte, shorting the battery life, and deterioration of the battery performance.

NOTICE

Do not remove the aluminum sealing sheet [A] from the filler ports [B] until just prior to use. Be sure to use the dedicated electrolyte container for correct electrolyte volume.

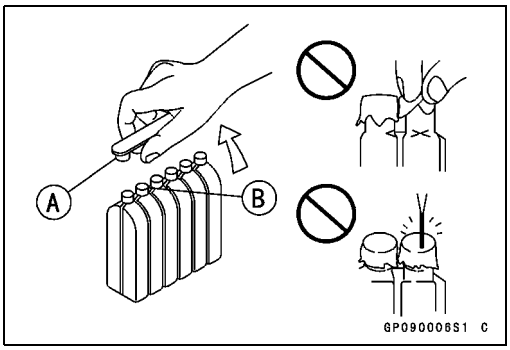


- Place the battery on a level surface.
- Check to see that the sealing sheet has no peeling, tears, or holes in it.
- Remove the sealing sheet.

NOTE

○*The battery is vacuum sealed. If the sealing sheet has leaked air into the battery, it may require a longer initial charge.*

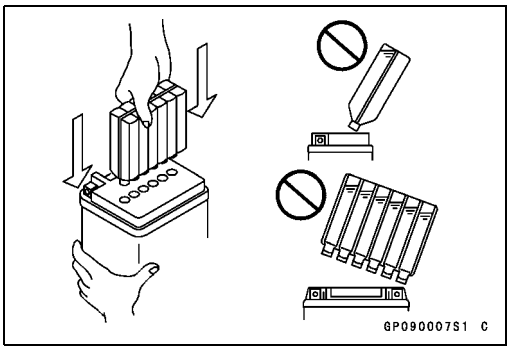
- Remove the electrolyte container from the vinyl bag.
- Detach the strip of caps [A] from the container and set aside, these will be used later to seal the battery.



NOTE

○*Do not pierce or otherwise open the sealed cells [B] of the electrolyte container. Do not attempt to separate individual cells.*

- Place the electrolyte container upside down with the six sealed cells into the filler ports of the battery. Hold the container level, push down to break the seals of all six cells. You will see air bubbles rising into each cell as the ports fill.



NOTE

○*Do not tilt the electrolyte container*

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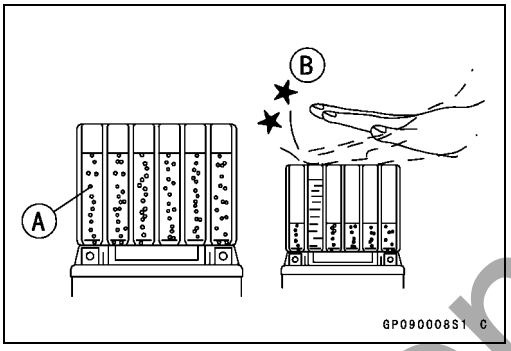
Battery

● Check the electrolyte flow.

★If no air bubbles [A] are coming up from the filler ports, or if the container cells have not emptied completely, tap the container [B] a few times.



● Keep the container in place for **20** minutes or more. Don't remove the container from the battery until it's empty, the battery requires all the electrolyte from the container for proper operation.

NOTICE

Removal of the container before it is completely empty can shorten the service life of the battery. Do not remove the electrolyte container until it is completely empty and 20 minutes have elapsed.

● Gently remove the container from the battery.

● Let the battery sit for **60** minutes prior to charging to allow the electrolyte to permeate into the plates for optimum performance.

NOTE

○*Charging the battery immediately after filling can shorten service life. Let the battery sit for at least **60** minutes after filling.*

Initial Charge

● Place the strip [A] of caps loosely over the filler ports.

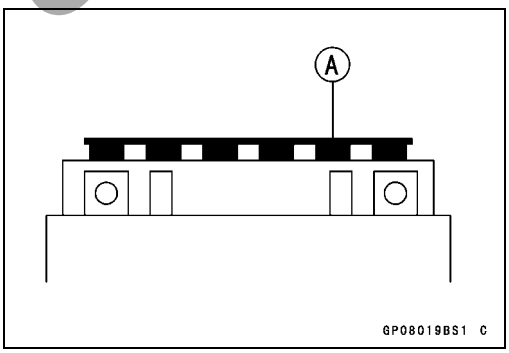
● Newly activated sealed batteries require an initial charge.

Standard Charge 1.2 A × 5 ~ 10 hours

★If using a recommended battery charger, follow the charger's instructions for newly activated sealed battery.

Kawasaki-recommended chargers:
Optimate III
Yuasa 1.5 Amp Automatic Charger
Battery Mate 150–9

★If the above chargers are not available, use equivalent one.



NOTE

○*Charging rates will vary depending on how long the battery has been stored, temperature, and the type of charger used. Let battery sit 30 minutes after initial charge, then check voltage using a voltmeter. If it is not at least 12.8 volts, repeat charging cycle.*

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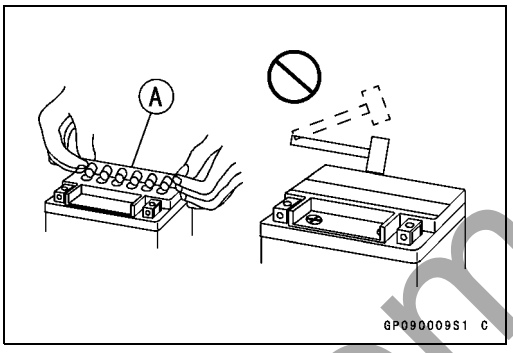
Battery

● After charging is completed, press down firmly with both hands to seat the strip of caps [A] into the battery (don't pound or hammer). When properly installed, the strip of the caps will be level with the top of the battery.



NOTICE

Once the strip of the caps [A] is installed onto the battery, never remove the caps, nor add water or electrolyte to the battery.

NOTE

○ *To ensure maximum battery life and customer satisfaction, it is recommended the battery be load tested at three times its amp-hour rating for 15 seconds. Re-check voltage and if less than 12.8 volts repeat the charging cycle and load test. If still below 12.8 volts the battery is defective.*

Precautions

1) No need of topping-up
   No topping-up is necessary in this battery until it ends its life under normal use. Forcibly prying off the seal cap to add water is very dangerous. Never do that.
2) Refreshing charge
   If an engine will not start, a horn sounds weak, or lamps are dim, it indicates the battery has been discharged. Give refresh charge for 5 to 10 hours with charge current shown in the specification (see Refreshing Charge).
   When a fast charge is inevitably required, do it following precisely the maximum charge current and time conditions indicated on the battery.

NOTICE

This battery is designed to sustain no unusual deterioration if refresh-charged according to the method specified above. However, the battery's performance may be reduced noticeably if charged under conditions other than given above.
Never remove the seal caps during refresh charge.
If by chance an excessive amount of gas is generated due to overcharging, the safety valve operates to keep the battery safe.

3) When you do not use the vehicle for months
   Give a refresh charge before you store the vehicle and store it with the negative cable removed. Give a refresh charge once a month during storage.
4) Battery life
   If the battery will not start the engine even after several refresh charges, the battery has exceeded its useful life. Replace it. (Provided, however, the vehicle's starting system has no problem.)

⚠ DANGER

Batteries produce an explosive gas mixture of hydrogen and oxygen that can cause serious injury and burns if ignited. Keep the battery away from sparks and open flames during charging. When using a battery charger, connect the battery to the charger before turning on the charger. This procedure prevents sparks at the battery terminals which could ignite any battery gases. The electrolyte contains sulfuric acid. Be careful not to have it touch your skin or eyes. If touched, wash it off with liberal amount of water and seek medial attention for more severe burns.

Interchange

A sealed battery can fully display its performance only when combined with a proper vehicle electrical system. Therefore, replace a sealed battery only on a vehicle which was originally equipped with a sealed battery.

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Battery

Be careful, if a sealed battery is installed on a vehicle which had an ordinary battery as original equipment, the sealed battery's life will be shortened.

Charging Condition Inspection

Battery charging condition can be checked by measuring battery terminal voltage.

- Remove the battery (see Battery Removal).

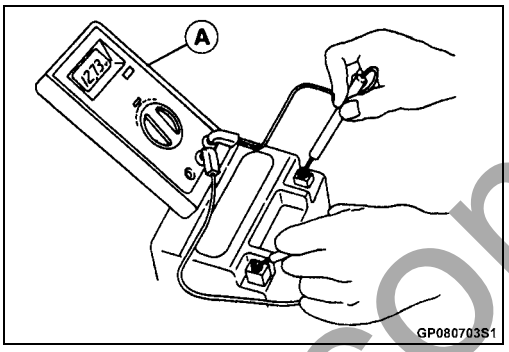
NOTICE

Be sure to disconnect the negative (−) cable first.

- Measure the battery terminal voltage.

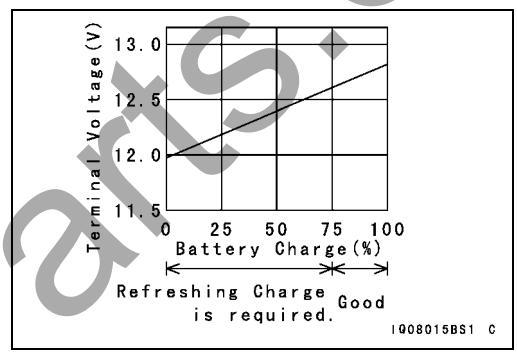
NOTE

○*Measure with a digital voltmeter [A] which can be read to one decimal place voltage.*

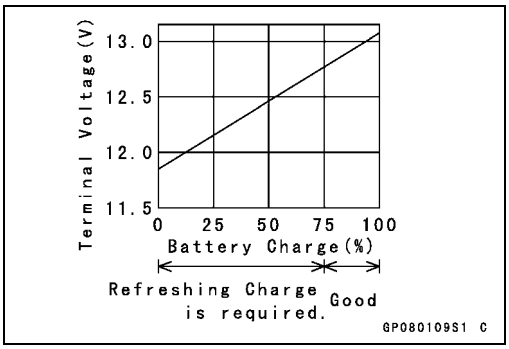


★If the reading is below the specified, refreshing charge is required.

Battery Terminal Voltage (US model)
Standard: 12.6 V or more



Battery Terminal Voltage (CA model)
Standard: 12.8 V or more

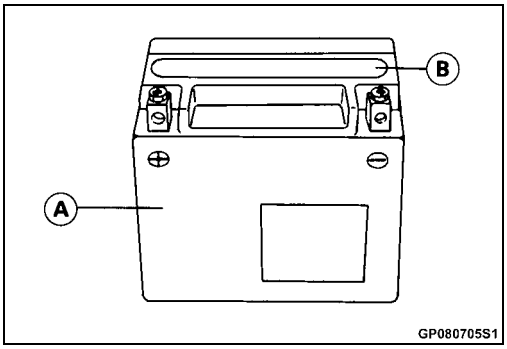


Refreshing Charge

- Remove the battery [A] (see Battery Removal).
- Refresh-charge by following method according to the battery terminal voltage.

⚠ WARNING

This battery is sealed type. Never remove sealing cap [B] even at charging. Never add water. Charge with current and time as stated below.



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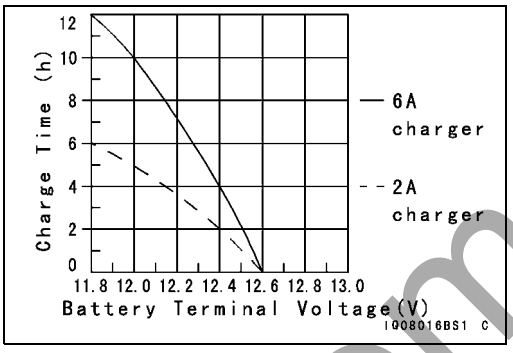
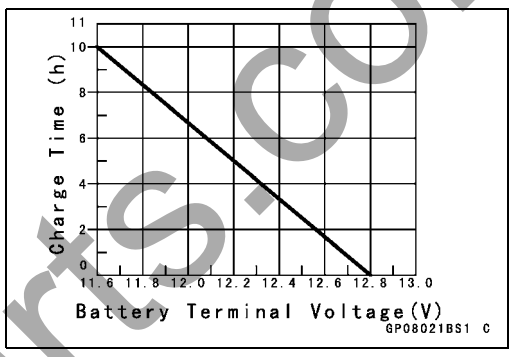
Battery

(US model)
Terminal Voltage: 11.8 ~ less than 12.6 V
Standard Charge (see following chart)
2 A × 4 ~ 12 h
6 A × 2 ~ 6 h



(CA model)
Terminal Voltage: 11.5 ~ less than 12.8 V
Standard Charge
1.2 A × 5 ~ 10 h (see following chart)
Quick Charge
6.0 A × 1.0 h



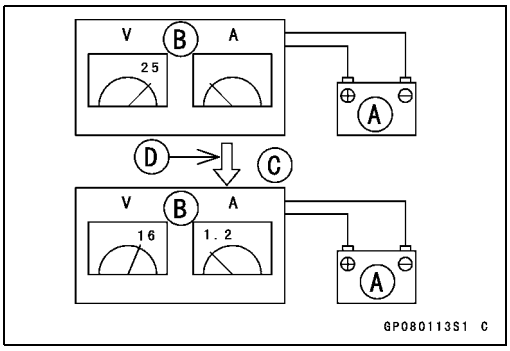
NOTICE

If possible, do not quick charge. If the quick charge is done due to unavoidable circumstances, do the standard charge later on.

Terminal Voltage: less than 11.5 V
Charging Method: 1.2 A × 20 h

NOTE

○*Increase the charging voltage to a maximum voltage of 25 V if the battery will not accept current initially. Charge for no more than 5 minutes at the increased voltage then check if the battery is drawing current. If the battery will accept current [D], decrease the voltage and charge by the standard charging method described on the battery case. If the battery will not accept current after 5 minutes, replace the battery.*



Battery [A]
Battery Charger [B]
Standard Value [C]

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Battery

● Determine battery condition after refreshing charge.
○Determine the condition of the battery 30 minutes after completion of the charge by measuring the terminal voltage according to the table below.

(US model)

Criteria	Judgement
12.6 V or higher	Good
12.0 ~ 12.5 V or lower	Charge insufficient → Recharge
12.0 V or lower	Unserviceable → Replace

(CA model)

Criteria	Judgement
12.8 V or higher	Good
12.0 ~ 12.7 V or lower	Charge insufficient → Recharge
12.0 V or lower	Unserviceable → Replace

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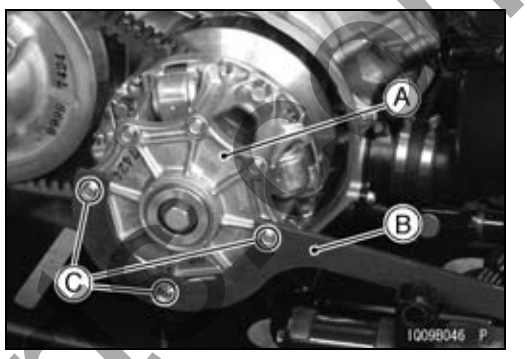
Charging System

Alternator Cover Removal

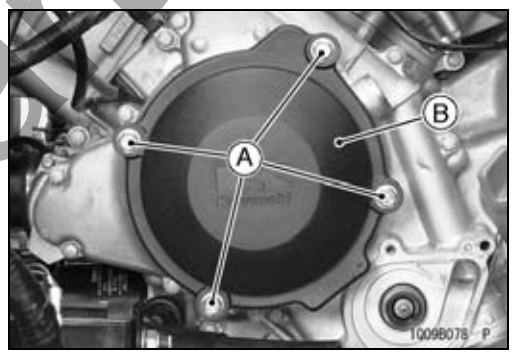
- Drain:
  Coolant (see Coolant Change in the Periodic Maintenance chapter)
  Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)
- Remove:
  Torque Converter Cover (see Torque Converter Cover Removal in the Converter System chapter)

- Remove the three bolts of the drive pulley cover [A].
- Install the drive pulley holder [B], tightening the removed three bolts [C].

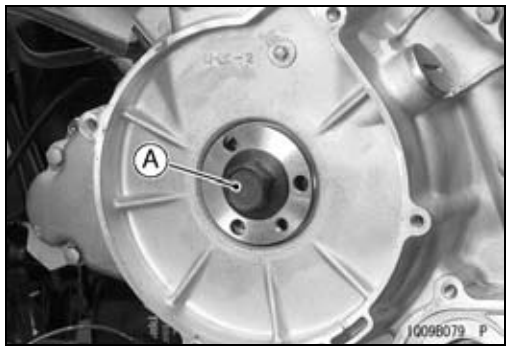
Special Tool - Drive Pulley Holder: 57001-1620



- Remove:
  Left Cover (see Left Cover Removal in the Frame chapter)
  Water Pump Impeller (see Water Pump Impeller Removal in the Cooling System chapter)
  Bolts [A] and Left Engine Cover [B]

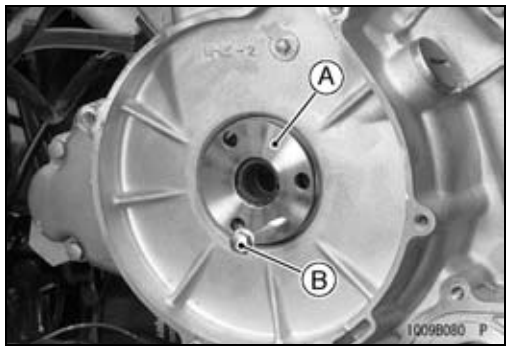


- Holding the drive pulley with the drive pulley holder, remove the alternator rotor bolt [A].



- Remove:
  Collar [A]

○Install a M6 bolt [B] to the collar, and remove it.



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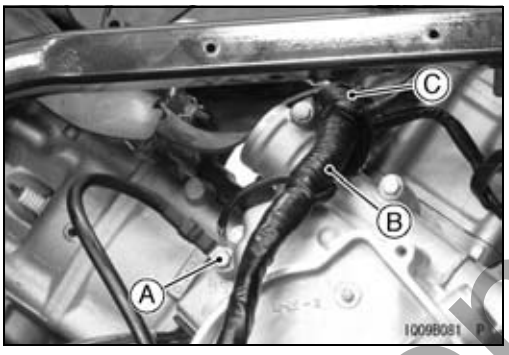
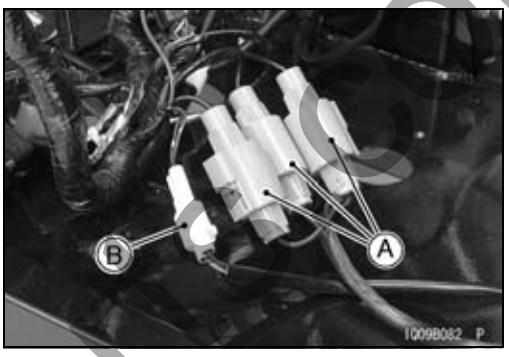
Charging System

- Remove:
  Engine Ground Terminal Bolt [A]
- Remove the main harness [B] from the clamp [C].



- Disconnect:
  Alternator Lead Connectors [A]
  Crankshaft Sensor Lead Connector [B]

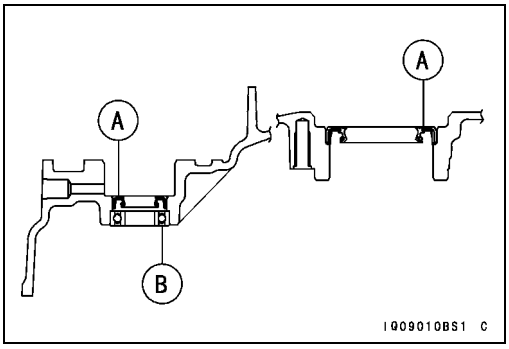


- Remove:
  Alternator Cover Bolts [A]
  Alternator Cover [B]

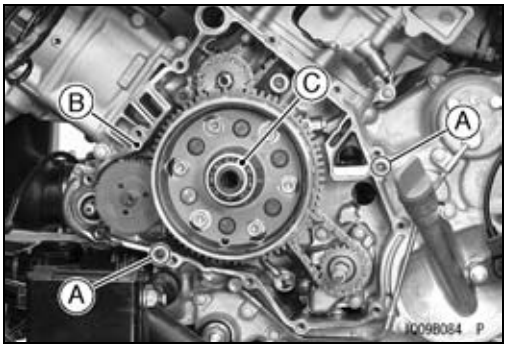
Alternator Cover Installation

- When installing the oil seals [A], press the oil seals in the alternator cover so that each oil seal surface is flush with the cover end as shown in the figure.
- Apply grease to the oil seal lips.
- When installing the ball bearing [B], press the ball bearing until it is bottomed.

Special Tool - Bearing Driver Set: 57001-1129



- Be sure all of the old gasket has been removed from the alternator cover and the left crankcase sealing surfaces.
- Check that the dowel pins [A] are in place, and fit a new gasket [B] on the crankcase.
- Check that the bearing [C] is in place.



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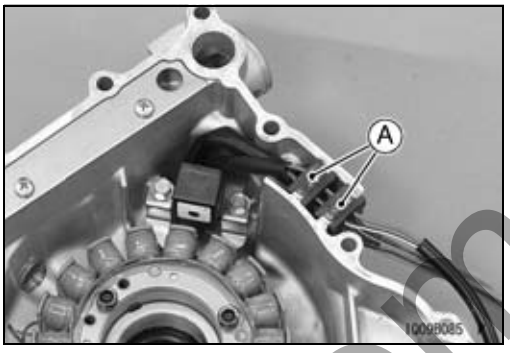
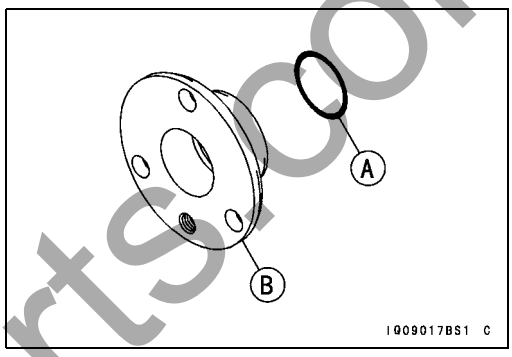
Charging System

- Fit the grommets [A] into the notch in the cover (see Crankshaft Sensor Installation).
- Apply grease to the alternator cover oil seal.
- Install the alternator cover.
- Tighten:

Torque - Alternator Cover Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the collar [B] and O-ring on the alternator cover.



- Hold the drive pulley with the drive pulley holder [A].

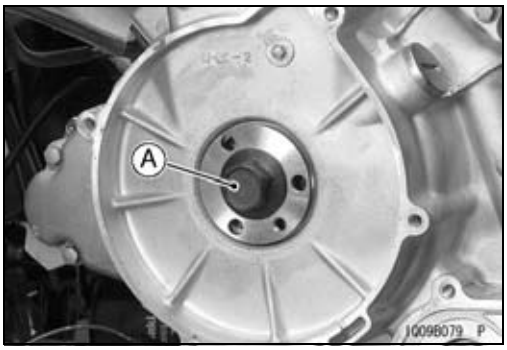
Special Tool - Drive Pulley Holder: 57001-1620

- Tighten:

Torque - Alternator Rotor Bolt [A]: 127 N·m (13.0 kgf·m, 94 ft·lb)

- Apply a non-permanent locking agent to the left engine cover bolts.
- Tighten:

Torque - Left Engine Cover Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)



- Install the removed parts (see appropriate chapter).
- Pour:

Coolant (see Coolant Change in the Periodic Maintenance chapter)
Engine Oil (see Engine Oil Change in the Periodic Maintenance chapter)

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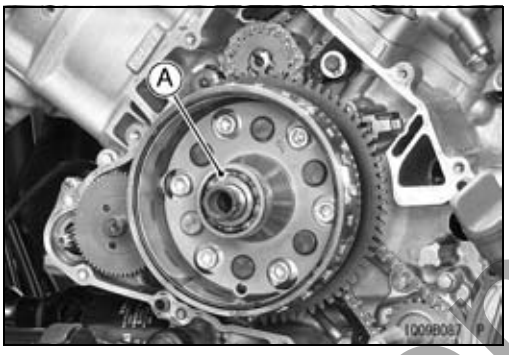
Charging System

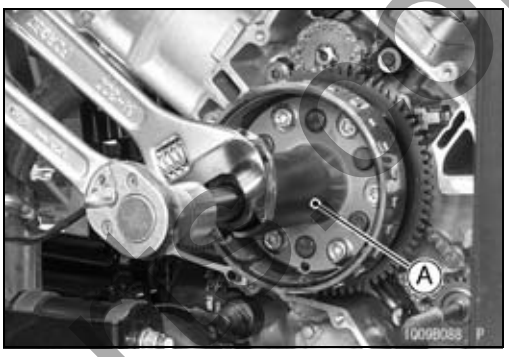
Alternator Rotor Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Ball Bearing [A]



- Screw the flywheel puller [A] onto the alternator rotor.

Special Tool - Flywheel Puller Assembly, M38 × 1.5/M35 × 1.5: 57001-1405



- Holding the flywheel puller, turn the rotor puller bolt until the alternator rotor is forced off the end of the crankshaft.

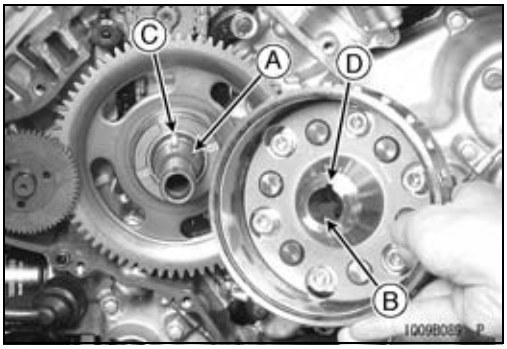
NOTICE

If the rotor is difficult to remove, turn the puller while tapping the end of the puller. Do not strike the alternator rotor. Striking the rotor can cause the magnets to lose magnetism.

Alternator Rotor Installation

- When installing the starter clutch gear [A], apply molybdenum disulfide grease to the crankshaft [B].

- Using a cleaning fluid, clean off any oil or dirt on the following portions and dry them with a clean cloth.
  Crankshaft Tapered Portion [A]
  Alternator Rotor Tapered Portion [B]
- Fit the rotor onto the crankshaft so that woodruff key [C] fits into the groove [D] in the hub of the rotor.



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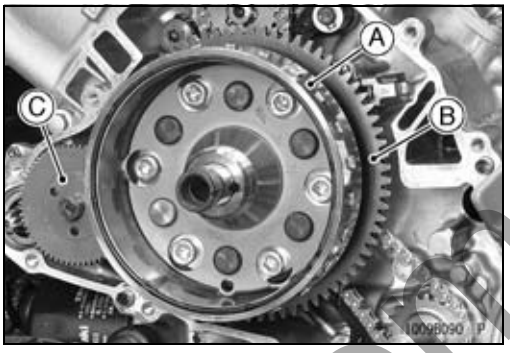
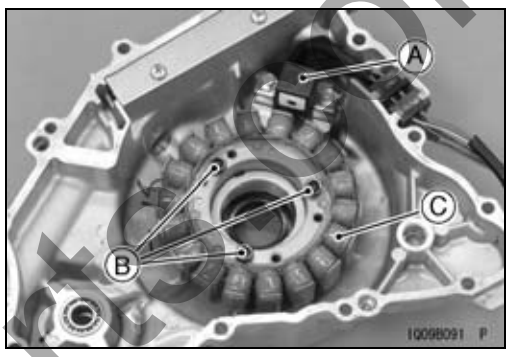
Charging System

- Install the alternator rotor [A] while turning the starter clutch gear [B].
- Apply molybdenum disulfide grease to the shaft of the torque limiter [C].
- Install the torque limiter.



Alternator Stator Removal

- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Crankshaft Sensor [A] (see Crankshaft Sensor Removal)
  Bolts [B] and Alternator Stator [C]



Alternator Stator Installation

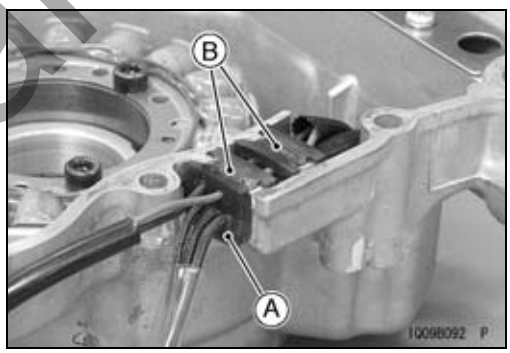
- Tighten:

  Torque - Alternator Stator Bolts: 13.5 N·m (1.4 kgf·m, 10 ft·lb)

- Install:
  Crankshaft Sensor (see Crankshaft Sensor Installation)
- Fit the lead grommets into the notch on the alternator cover.
  Grommets [A] for Alternator Leads
  Grommets [B] for Crankshaft Sensor Leads

○Run the alternator stator leads under the crankshaft sensor leads.

○Fit the grommet for alternator leads first and then install the one of crankshaft sensor leads to the notch of the alternator cover.



Regulator/Rectifier Output Voltage Inspection

- Remove the left seat (see Seat Removal in the Frame chapter).
- Check the battery condition (see Battery section).
- Warm up the engine to obtain actual alternator operating conditions.

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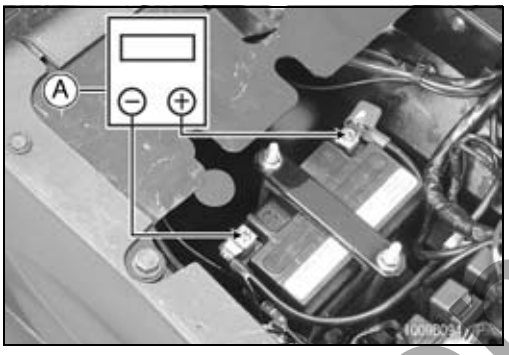
Charging System



- Check that the ignition switch is turned off, and connect a hand tester [A] to the battery terminals.

Special Tool - Hand Tester: 57001-1394

- Start the engine and note the voltage readings at various engine speeds with the headlight turned on and then off. The readings should show nearly battery voltage when the engine speed is low, and as the engine speed increases, the readings should also increase.

Regulator/Rectifier Output Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
25 V DC	Battery (+)	Battery (–)	14 ~ 15 V

- Turn off the ignition switch, and disconnect the hand tester.

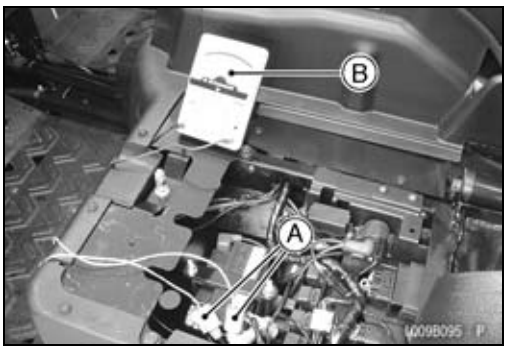
★If the regulator/rectifier output voltage is between the values given in the table, the charging system is working normally.

★If the output voltage is much higher than the values specified in the table, the regulator/rectifier is defective or the regulator/rectifier leads are loose or open.

★If the battery voltage does not increase as the engine speed increases, then the regulator/rectifier is defective or the alternator output is insufficient for the loads. Check the alternator and regulator/rectifier to determine which part is defective.

Alternator Inspection

There are three types of alternator failures: short, open, or loss in rotor magnetism. A short or open in one of the coil wires will result in either a low output, or no output at all. A loss in rotor magnetism, which may be caused by dropping or hitting the alternator, by leaving it near an electromagnetic field, or just by aging, will result in low output.



- To check the alternator output voltage, perform the following procedures.

○Disconnect the alternator lead connectors [A].
○Connect a hand tester [B] as shown in the table.
○Start the engine.
○Run it at the rpm given in the table.
○Note the voltage readings (total 3 measurements).

Alternator Output Voltage

Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	at 4 000 rpm
250 V AC	One black lead	Another black lead	52 ~ 78 V

★If the output voltage is within the values in the table, the alternator is operating correctly, and the regulator/rectifier is damaged. A much lower reading indicates that the alternator is defective.

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Charging System

● Check the stator coil resistance as follows:
○Stop the engine.
○Disconnect the alternator connector.
○Connect a hand tester as shown in the table.
○Note the readings (total 3 measurement).

Stator Coil Resistance **at 20°C (68°F)**

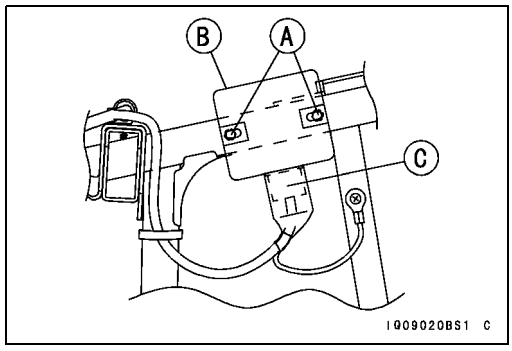
Tester Range	Connections		Reading
	Tester (+) to	Tester (–) to	
× 1 Ω	One black lead	Another black lead	0.24 ~ 0.36 Ω

★If there is more resistance than shown in the table, or no reading (infinity) for any two leads, the stator has an open and must be replaced. Much less resistance means the stator is shorted and must be replaced.
● Using the highest resistance range of the hand tester, measure the resistance between each of the black leads and chassis ground.
★Any reading less than infinity (∞) indicates a short, necessitating stator replacement.
★If the stator coils have normal resistance, but the voltage check shows the alternator to be defective; then the rotor magnetism has probably weakened, and the rotor must be replaced.

Special Tool - Hand Tester: 57001-1394

Regulator/Rectifier Removal

● Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
● Remove:
Regulator/Rectifier Mounting Bolts [A]
Regulator/Rectifier [B]
● Disconnect the regulator/rectifier lead connector [C].



Regulator/Rectifier Installation

● Connect the regulator/rectifier lead connector.
● Install:
Regulator/Rectifier
● Tighten:

Torque - Regulator/Rectifier Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)

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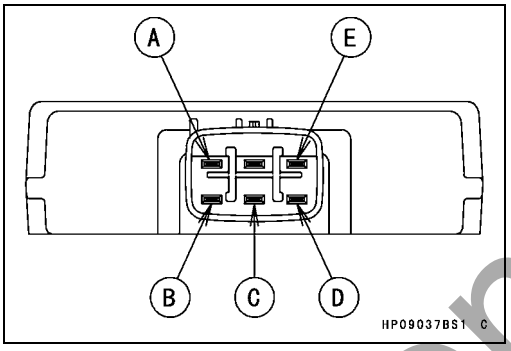
Charging System

Regulator/Rectifier Inspection



- Remove:
  Regulator/Rectifier (see Regulator/Rectifier Removal)
- Set the hand tester to the × 1 kΩ range and make the measurements shown in the table.

Special Tool - Hand Tester: 57001-1394

- Connect the hand tester to the regulator/rectifier.

★If the tester readings are not as specified, replace the regulator/rectifier.

NOTICE

Use only Kawasaki Hand Tester 57001-1394 for this test. A tester other than the Kawasaki Hand Tester may show different readings.
If a megger or a meter with a large capacity battery is used, the regulator/rectifier will be damaged.

Regulator/Rectifier Resistance (Unit: kΩ)

		Tester (+) Lead Connection				
	Terminal	A	B	C	D	E
(–)*	A	–	∞	∞	∞	∞
	B	2 ~ 26	–	∞	∞	∞
	C	2 ~ 26	∞	–	∞	∞
	D	2 ~ 26	∞	∞	–	∞
	E	2 ~ 50	2 ~ 26	2 ~ 26	2 ~ 26	–

(−)*: Tester (−) Lead Connection

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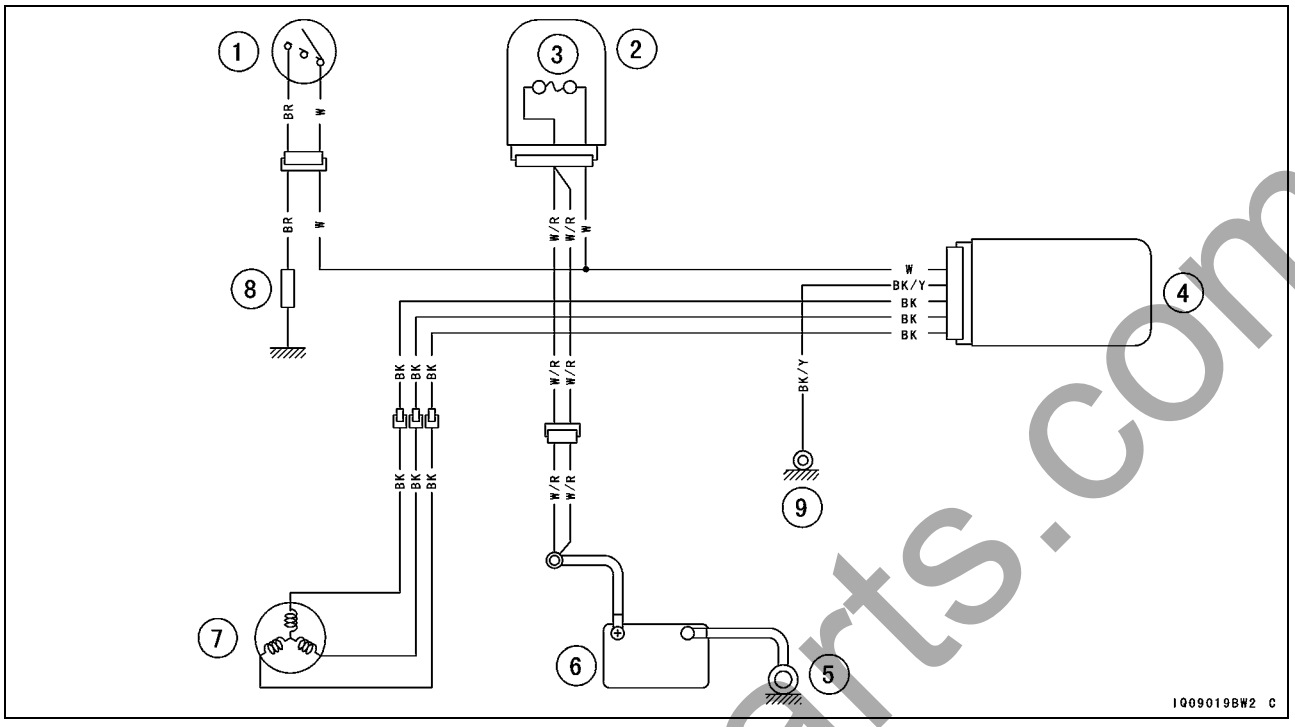
Charging System

Charging System Circuit



1. Ignition Switch
2. Fuse Box
3. Main Fuse 30 A
4. Regulator/rectifier
5. Engine Ground
6. Battery
7. Alternator
8. Loads
9. Frame Ground 2

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Ignition System

⚠ WARNING

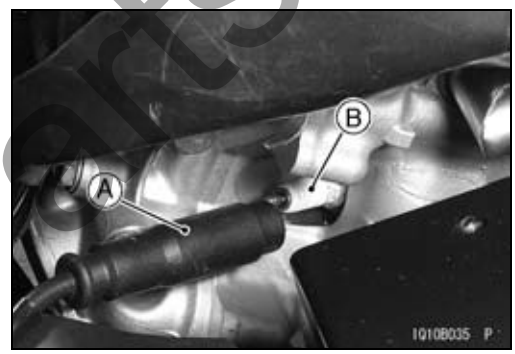
The ignition system produces extremely high voltage. Do not touch the spark plug, ignition coil or spark plug lead while the engine is running, or you could receive a severe electrical shock.

NOTICE

Do not disconnect the battery cables or any other electrical connections when the ignition switch is on, or while the engine is running. This is to prevent igniter damage.
Do not install the battery backwards. The negative side is grounded. This is to prevent damage to the diodes and igniter.
Use the standard regulator/rectifier, or the igniter will be damaged.

Spark Plug Removal

- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Rubber Covers
  Spark Plug Cap [A]
- Using a spark plug wrench, remove the spark plug [B].



Spark Plug Installation

- Tighten:

Torque - Spark Plugs: 13 N·m (1.3 kgf·m, 115 in·lb)

- Fit the spark plug caps securely.
- Pull up the spark plug caps lightly to make sure of the installation of the spark plug caps.

Spark Plug Cleaning/Inspection

- Refer to the Spark Plug Cleaning/Inspection in the Periodic Maintenance chapter.

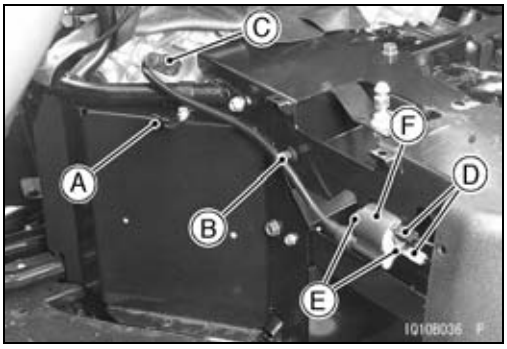
Spark Plug Gap Inspection

- Refer to the Spark Plug Gap Inspection in the Periodic Maintenance chapter.

Ignition Coil Removal

Front Side

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Rubber Cover
  Clamps [A] and [B]
  Spark Plug Cap [C]
  Primary Lead Connectors [D]
  Bolts [E]
  Ignition Coil [F]



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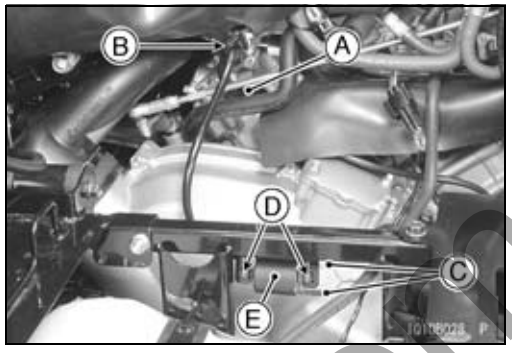
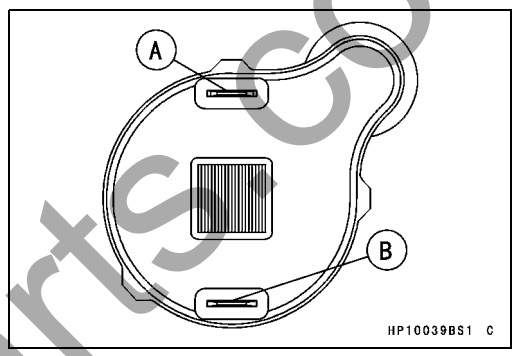
Ignition System

Rear Side



- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
  Rubber Cover
  Spark Plug Cap [A]
- Open the clamp [B].
- Remove:
  Primary Lead Connectors [C]
  Bolts [D]
  Ignition Coil [E]

Ignition Coil Installation



- Install:
  Ignition Coil

  Torque - Ignition Coil Mounting Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Connect the primary leads to the ignition coil terminals as shown.

Front Side

G/W Lead → (–) Terminal [A] (Green)
BR Lead → (+) Terminal [B] (Black)

Rear Side

BL/W Lead → (–) Terminal [A] (Green)
BR Lead → (+) Terminal [B] (Black)

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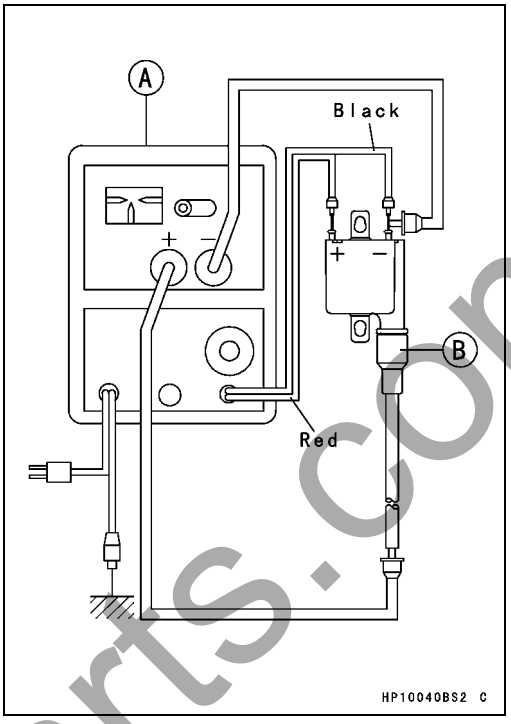
Ignition System

Ignition Coil Inspection



- Remove the ignition coil.
- Measure the arcing distance with a coil tester [A] to check the condition of the ignition coil [B].
- Connect the ignition coil (with the spark plug cap left attached at the end of the spark plug lead) to the tester in the manner prescribed by the manufacturer and measure the arcing distance.

Ignition Coil 3 Needle Arcing Distance
7 mm (0.28 in.) or more

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the coil body or leads.

★If the distance reading is less than the specified value, the ignition coil or spark plug cap is defective.

- To determine which part is defective, measure the arcing distance again with the spark plug cap removed from the ignition coil. Remove the cap by turning it counterclockwise.

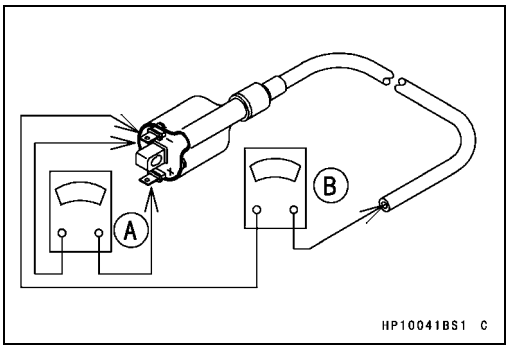
★If the arcing distance is as before, the trouble is with the ignition coil. If the arcing distance is normal, the trouble is with the spark plug cap.

★If a coil tester is not available, the coil can be checked for a broken or badly shorted winding with a hand tester.

Special Tool - Hand Tester: 57001-1394

NOTE

○*The hand tester cannot detect layer shorts and shorts resulting from insulation breakdown under high voltage.*



- Measure the primary winding resistance [A] as follows:

○Connect the tester between the coil terminals.
○Set the tester to the × 1 Ω range.

- Measure the secondary winding resistance [B] as follows:

○Remove the plug cap by turning it counterclockwise.
○Connect the tester between the spark plug lead and terminal.
○Set the tester to the × 1 kΩ range.

Ignition Coil Winding Resistance
Primary Windings: 1.84 ~ 2.76 Ω
Secondary Windings: 10.4 ~ 15.6 kΩ

★If the hand tester does not read as specified, replace the coil.

○To install the plug cap, turn it clockwise.

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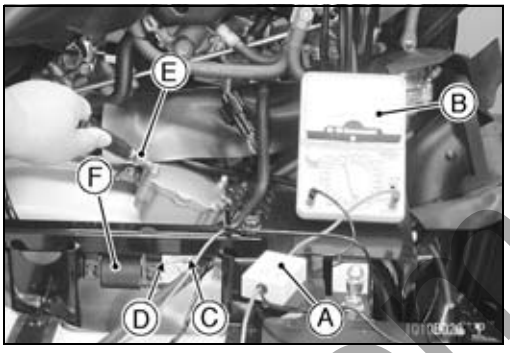
Ignition System

Ignition Coil Primary Peak Voltage Inspection



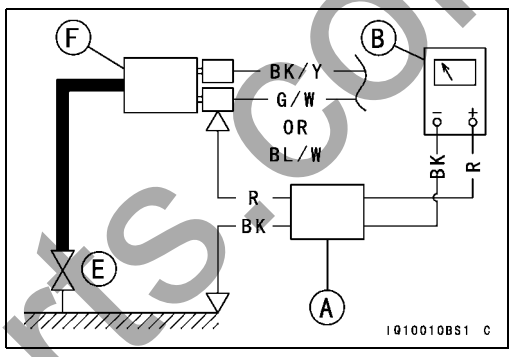
NOTE

○*Be sure the battery is fully charged.*

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
- Remove the spark plug cap (see Spark Plug Removal), but do not remove the spark plug.
- Measure the primary peak voltage as follows.

○Connect a commercially peak voltage adapter [A] to the hand tester [B] (1 000 V DC range). Install the needle adapter [C] on the peak voltage adapter leads.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B



○Insert the needle adapter into the terminal of the G/W (front) or BL/W (rear) primary lead [D].

○Install a new spark plug [E] into the spark plug cap, and ground it to the engine.
[F] Ignition Coil

⚠ WARNING

To avoid extremely high voltage shocks, do not touch the spark plugs or tester connections.

- Turn the ignition switch ON, rotate the engine for 4 ~ 5 seconds with the transmission in neutral to measure the primary peak voltage.
- Repeat the measurements 5 times for one ignition coil.

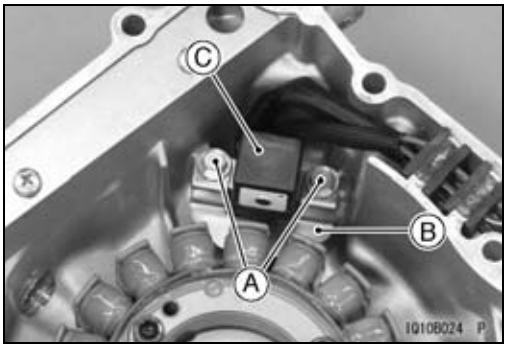
Ignition Coil Primary Peak Voltage
Standard: 160 V or more

- Repeat the test for the other ignition coil.

★If the reading is less than the specified value, check the following.
Ignition Coils (see Ignition Coil Inspection)
Crankshaft Sensor (see Crankshaft Sensor Inspection)

★If the ignition coils and crankshaft sensor are normal, see the Ignition System Troubleshooting chart on page 16-42.

Crankshaft Sensor Removal



- Remove:
  Alternator Cover (see Alternator Cover Removal)
  Crankshaft Sensor Mounting Bolts [A]
  Plate [B]
  Crankshaft Sensor [C]

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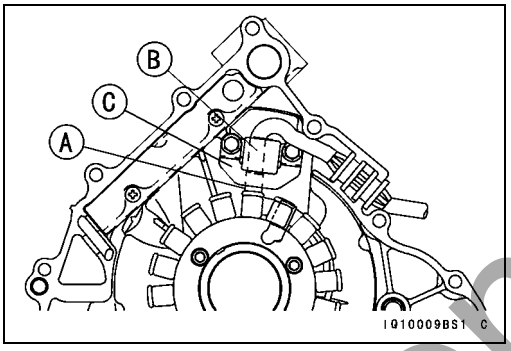
Ignition System

Crankshaft Sensor Installation

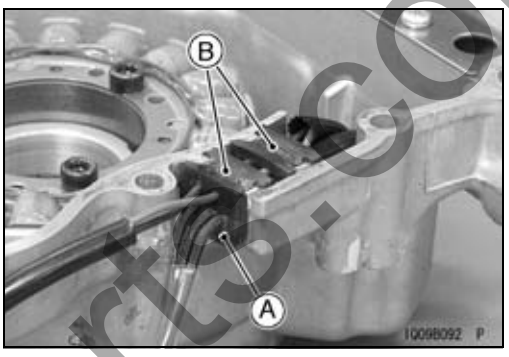


- Install:
  Stator Coil Leads [A]
  Crankshaft Sensor [B]
  Plate [C]
- Tighten:

Torque - Crankshaft Sensor Mounting Bolts: 5.9 N·m (0.60 kgf·m, 52 in·lb)

- Fit the lead grommets into the notch on the alternator cover.
  Grommets [A] for Alternator Leads
  Grommets [B] for Crankshaft Sensor Leads

○Position the blue lead of the crankshaft sensor to outside.



Crankshaft Sensor Inspection

- Remove the seat (see Seat Removal in the Frame chapter).
- Disconnect the crankshaft sensor lead connector [A].
- Measure the crankshaft sensor resistance.

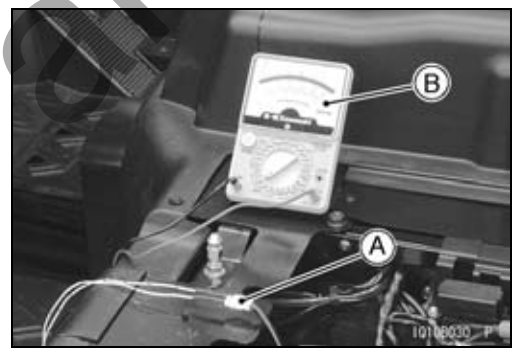
○Connect a hand tester [B] between the BK/W lead and the BL lead.

○Set the tester to the × 10 Ω range.

Special Tool - Hand Tester: 57001-1394

Crankshaft Sensor Resistance
110 ~ 140 Ω

★If the tester does not read as specified, replace the crankshaft sensor.



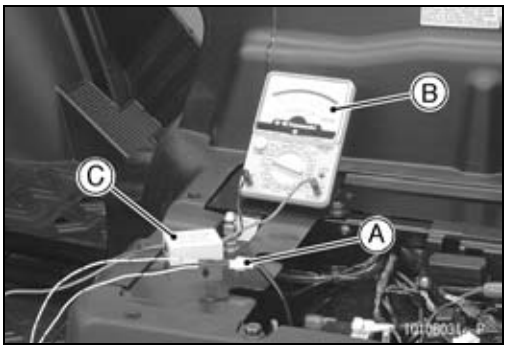
Crankshaft Sensor Peak Voltage Inspection

NOTE

○*Be sure the battery is fully charged.*

- Disconnect:
  Crankshaft Sensor Lead Connector [A]
- Set the hand tester [B] to the 10 V DC range.
- Connect the peak voltage adapter [C] to the hand tester and crankshaft sensor leads in the connector.

Special Tools - Hand Tester: 57001-1394
Peak Voltage Adapter: 57001-1415
Type: KEK-54-9-B



Connections:

Crankshaft Sensor Lead		Adapter		Hand Tester
Black/White	←	Red	→	(+)
Blue	←	Black	→	(–)

- Turn the ignition switch on, and rotate the engine for 4 ~ 5 seconds with the transmission gear in neutral to measure the crankshaft sensor peak voltage.

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Ignition System

● Repeat the measurement 5 or more times.

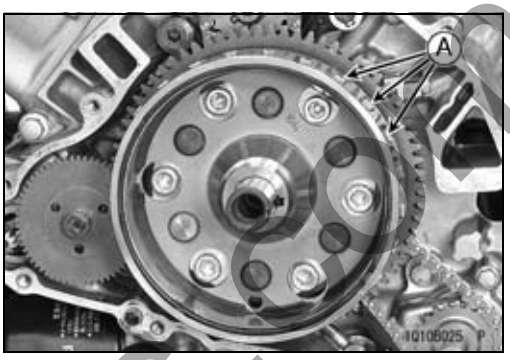
Crankshaft Sensor Peak Voltage
Standard: 2 V or more

★If the peak voltage is lower than the standard, inspect the crankshaft sensor.

Alternator Rotor Inspection

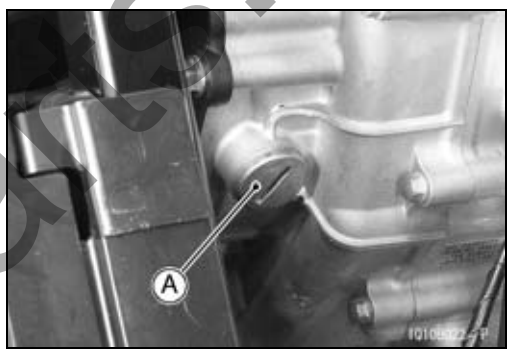
● Check the timing projection [A] for damage such as chipping or grooving.

★If the timing projection on the rotor is visibly damaged, replace the alternator rotor.



Ignition Timing Test

● Remove:
Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
Ignition Timing Inspection Plug [A]

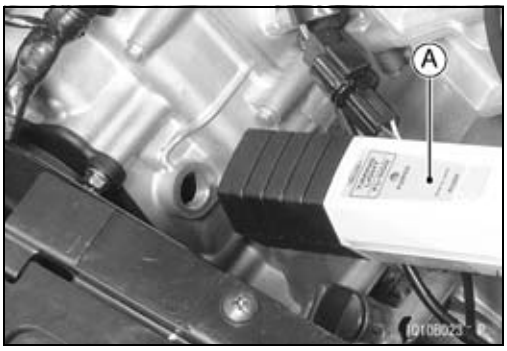


● Attach a timing light [A] and a tachometer in the manner prescribed by the manufacturer.

Special Tool - Timing Light: 57001-1241

● Start the engine and aim the timing light at the timing mark on the alternator rotor.

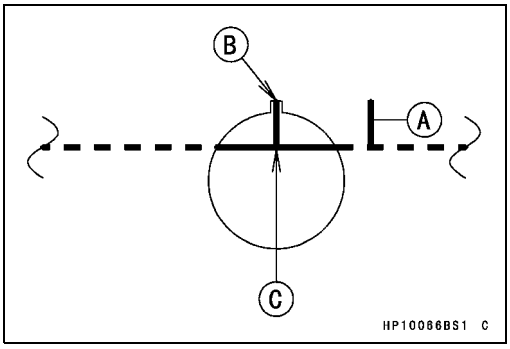
● Run the engine at the speeds specified and note the alignment of the timing marks.



[A] F or R mark

Ignition Timing

Engine speed r/min (rpm)	Slot [B] aligned with:
1 100 and below	Advanced mark [C] on alternator rotor



NOTE

○*Do not mix up the timing marks with mark [A].*

★If the ignition timing is incorrect, replace the ECU and the crankshaft sensor.

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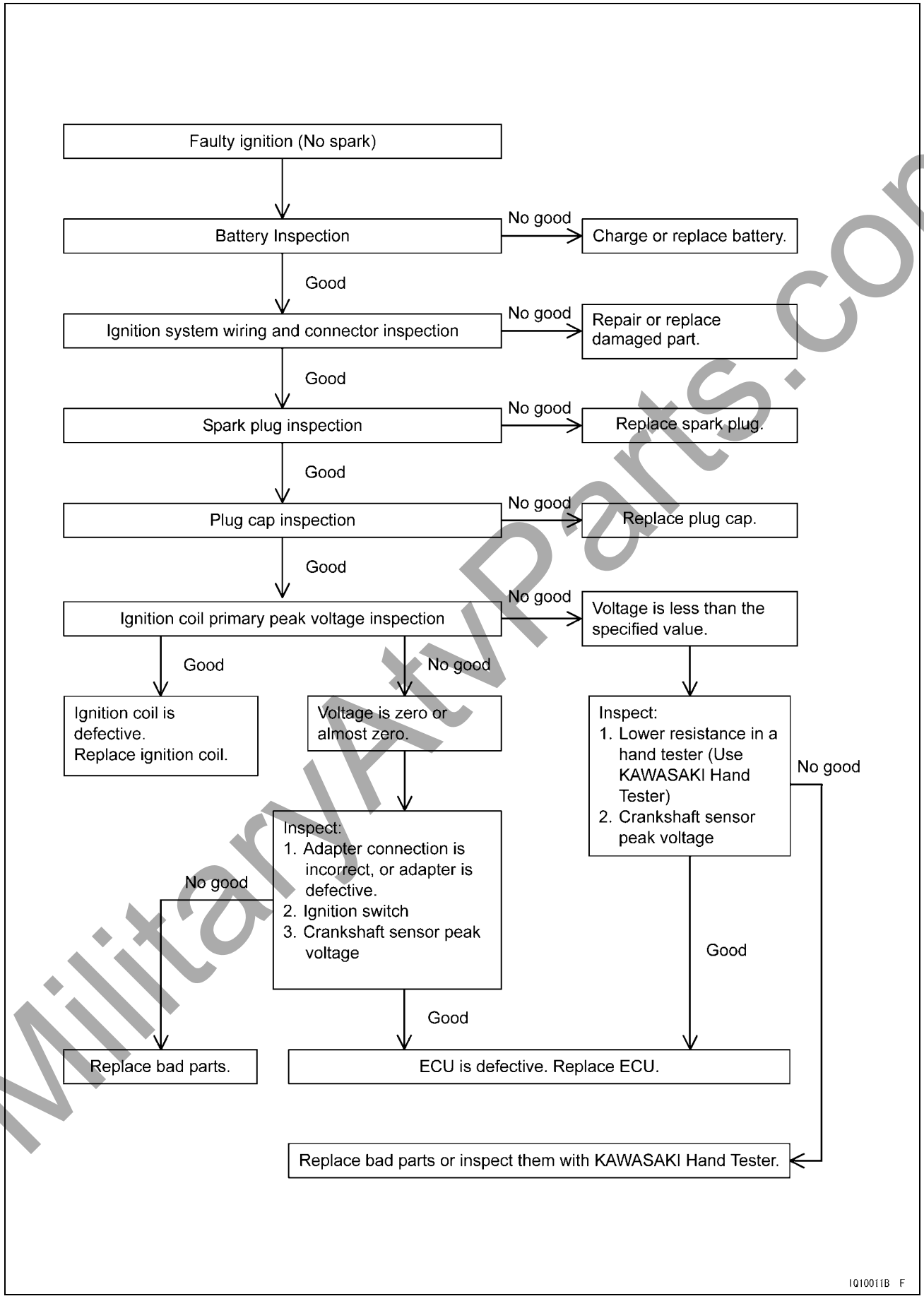
Ignition System

Ignition System Troubleshooting



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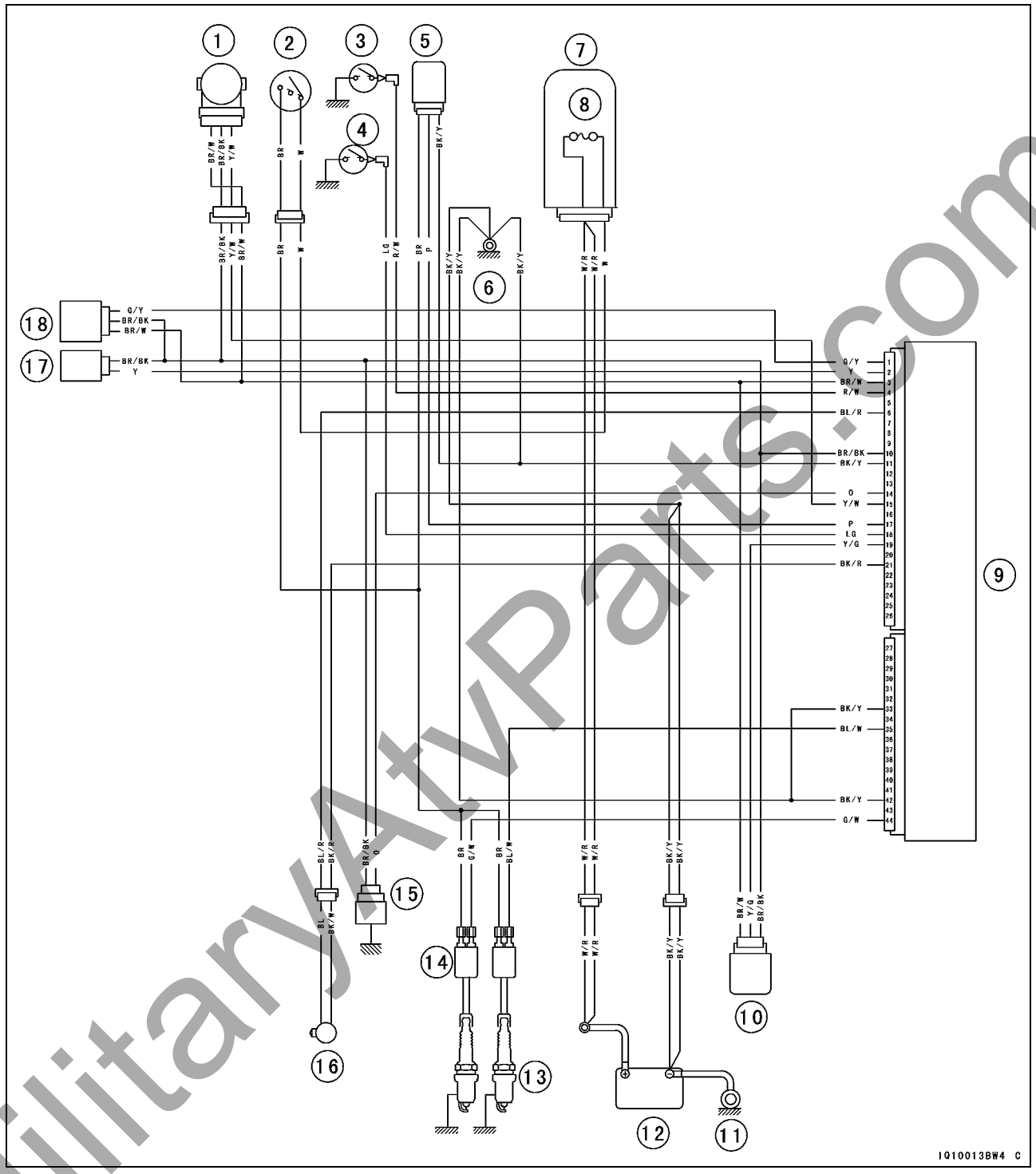
Ignition System

Ignition System Circuit



1. Throttle Sensor
2. Ignition Switch
3. Reverse Position Switch
4. Neutral Position Switch
5. Speed Sensor
6. Frame Ground 1
7. Fuse Box
8. Main Fuse 30 A
9. ECU (Electronic Control Unit)
10. Vehicle-down Sensor
11. Engine Ground
12. Battery
13. Spark Plugs
14. Ignition Coils
15. Water Temperature Sensor
16. Crankshaft Sensor
17. Inlet Air Temperature Sensor
18. Inlet Air Pressure Sensor

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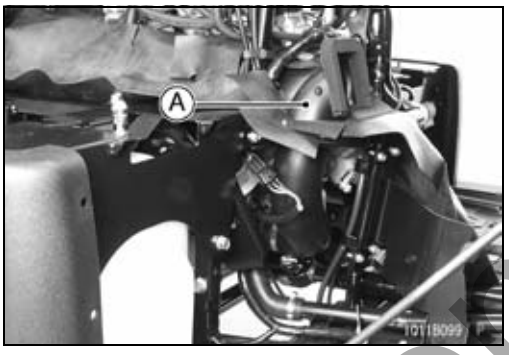
Electric Starter System

Starter Motor Removal

- Remove:
  Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
  Seat Lower Left Plate (see Seat Lower Left Plate Removal in the Frame chapter)
  Air Inlet Duct [A]

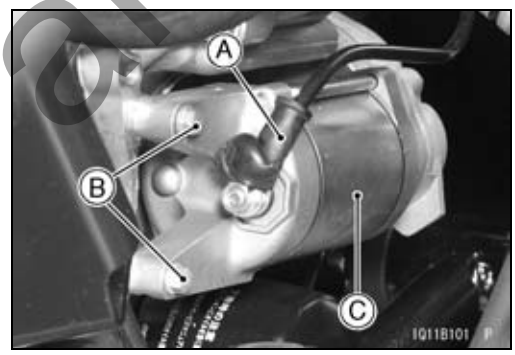


- Remove:
  Joint Duct [A], Bolts and Collars

- Remove:
  Starter Motor Cable [A] and Nut
  Starter Motor Mounting Bolts [B]
  Starter Motor [C]

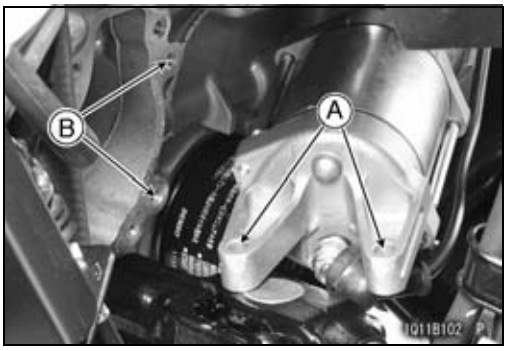
NOTICE

Do not tap the end of the starter motor shaft or the motor may be damaged.



Starter Motor Installation

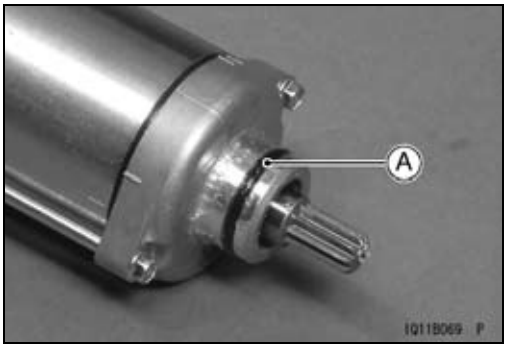
- Clean the starter motor lugs [A] and crankcase [B] where the starter motor is grounded.



- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring.
- Install the starter motor.

NOTICE

Do not tap the end of the starter motor shaft or the motor may be damaged.



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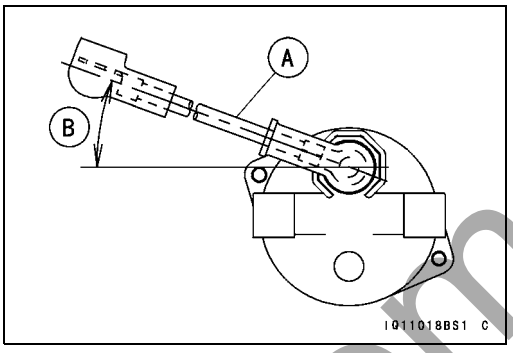
Electric Starter System

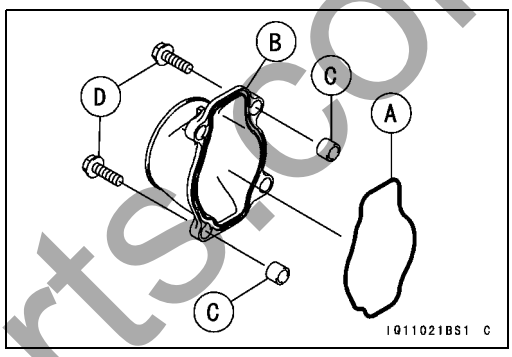
- Install the starter motor cable [A] at the angle as shown in the figure.
  [B] about 20°
- Tighten:

Torque - Starter Motor Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Starter Motor Cable Mounting Nut: 6.8 N·m (0.69 kgf·m, 60 in·lb)

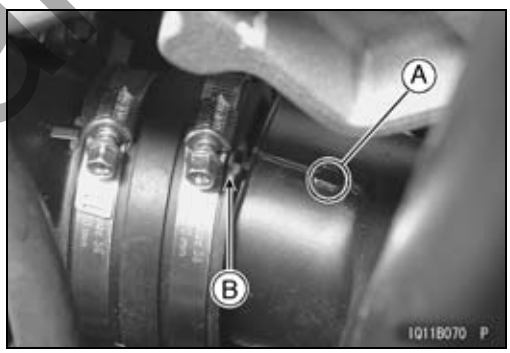


- Apply grease to the O-ring [A] in the joint duct [B].
- Install:
  Joint Duct and Collars [C]
- Tighten:

Torque - Joint Duct Bolts [D]: 8.8 N·m (0.90 kgf·m, 78 in·lb)

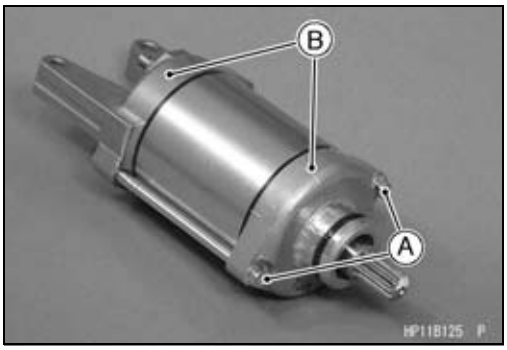


- Fit the projection [A] of the air inlet duct into the groove [B] of the rubber duct, and tighten the clamp screw.



Starter Motor Disassembly

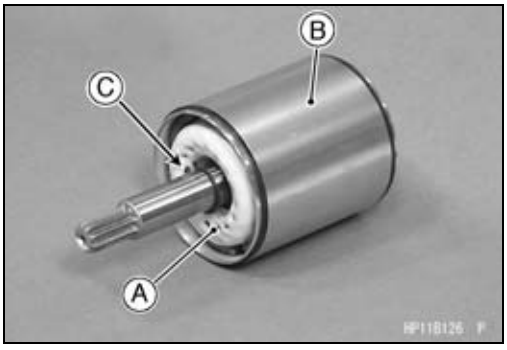
- Remove the starter motor (see Starter Motor Removal).
- Take off the starter motor through bolts [A] and remove the both end covers [B].



- Pull out the armature [A] out of the yoke [B].

NOTE

○*Do not remove the circlip [C] from the shaft.*



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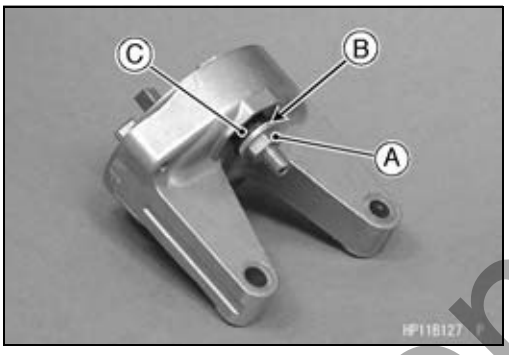
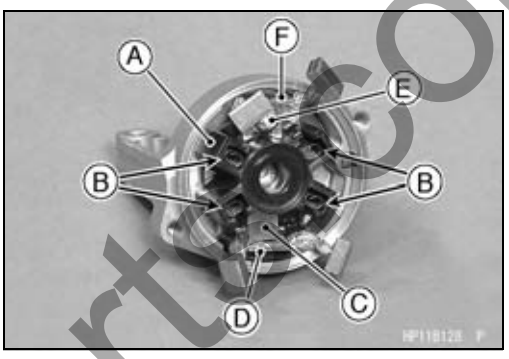
Electric Starter System

● Remove:
Starter Motor Terminal Locknut [A]
Washer [B]
Collar [C]

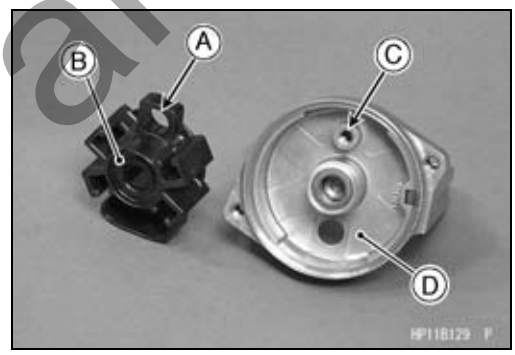


● Pull out the brushes from the brush holder [A].
● Remove:
Brush Springs [B]
Starter Motor Terminal [C]
Positive Brush Assy [D] and O-ring
Screw [E]
Negative Brush Assy [F]
Brush Holder

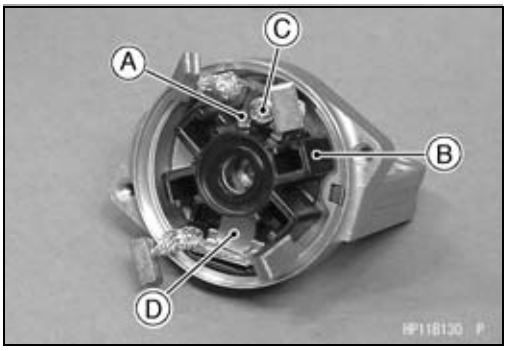


Starter Motor Assembly

● Align the hole [A] of the brush holder [B] to the boss [C] of the end cover [D].

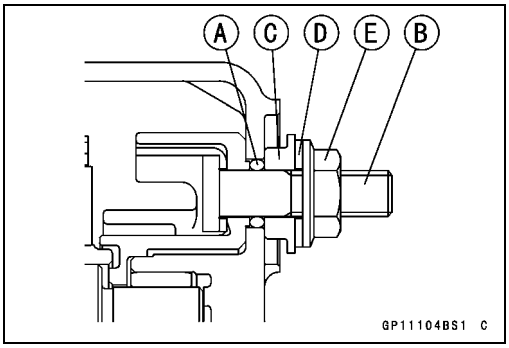


● Install the negative brush assy [A] to the brush holder [B].
● Tighten the screw [C] securely.
● Install the positive brush assy [D] to the brush holder.
● Install the starter motor terminal.



● Replace the O-ring [A] with a new one.
● Install the following parts to the starter motor terminal [B].
O-ring
Collar [C]
Washer [D]
Starter Motor Terminal Locknut [E]
○Install the collar so that stepped side faces outward.
● Tighten:

Torque - Starter Motor Terminal Locknut: 11 N·m (1.1 kgf·m, 97 in·lb)



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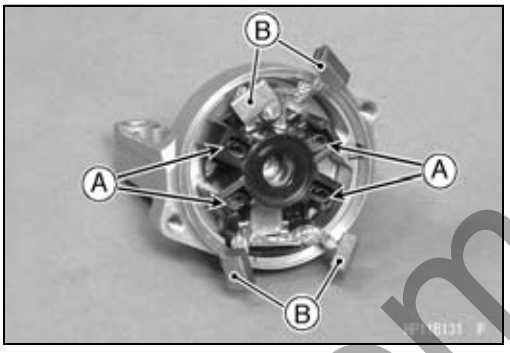
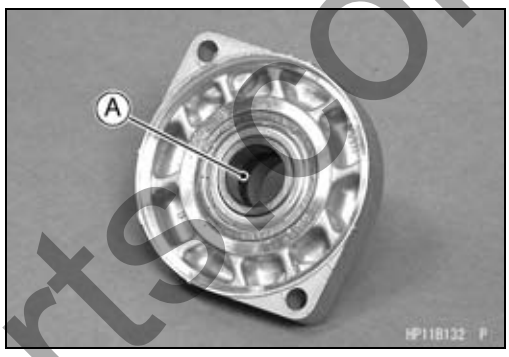
Electric Starter System

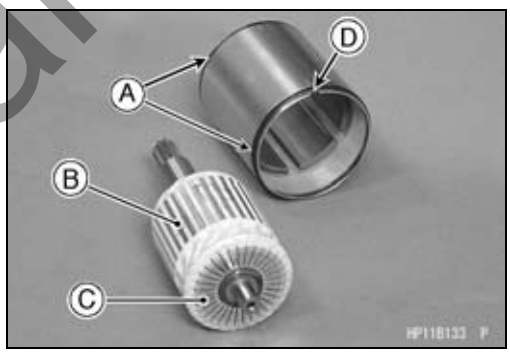
- Install the brush springs [A].
- Insert the brushes [B] to the brush holder.



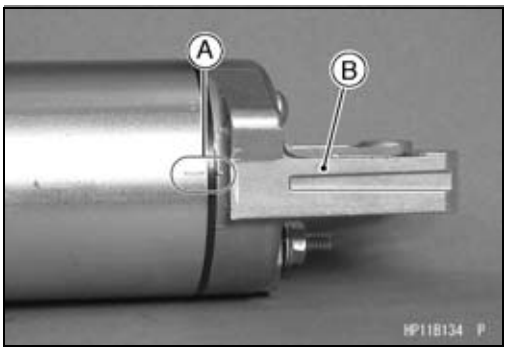
- Apply thin coat of grease to the oil seal [A].



- Replace the O-rings [A] with new ones.
- Insert the armature [B] so that commutator side [C] faces hollow side [D] of the yoke.



- Align the marks [A] to assembly the yoke and the end cover [B] as shown.



- Tighten:

Torque - Starter Motor Through Bolts [A]: 5.0 N·m (0.51 kgf·m, 44 in·lb)

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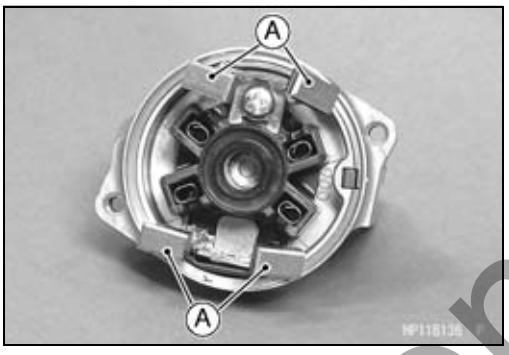
Electric Starter System

Brush Inspection

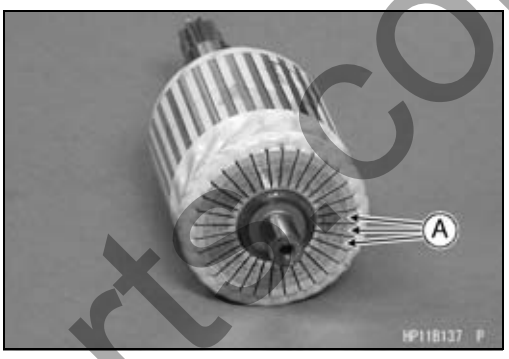


- Measure the length of each brush [A].

★If any is worn down to the service limit, replace the brush assy.

Starter Motor Brush Length
Standard: 12 mm (0.47 in.)
Service Limit: 6.5 mm (0.26 in.)

Commutator Cleaning and Inspection



- Clean the metallic debris off the between commutator segments [A].

NOTE

○*Do not use emery or sand paper on the commutator.*

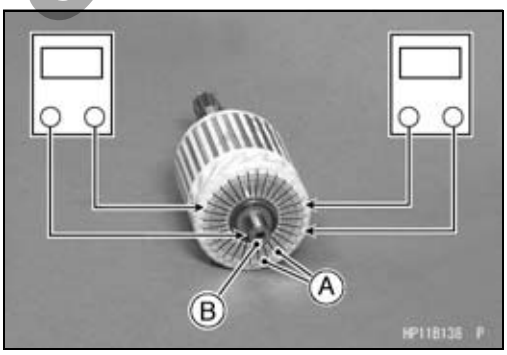
- Check the commutator for damage or abnormal wear.

★Replace the starter motor with a new one if there is any damage or wear.

- Visually inspect the commutator segments for discoloration.

★Replace the starter motor with a new one if discoloration is noticed.

Armature Inspection



- Using the × 1 Ω hand tester range, measure the resistance between any two commutator segments [A].

Special Tool - Hand Tester: 57001-1394

★If there is a high resistance or no reading (∞) between any two segments, a winding is open and the starter motor must be replaced.

- Using the highest hand tester range, measure the resistance between the segments and the shaft [B].

★If there is any reading at all, the armature has a short and the starter motor must be replaced.

NOTE

○*Even if the foregoing checks show the armature to be good, it may be defective in some manner not readily detectable with the hand tester. If all other starter motor and starter motor circuit components check good, but the starter motor still does not turn over or only turns over weakly, replace the starter motor with a new one.*

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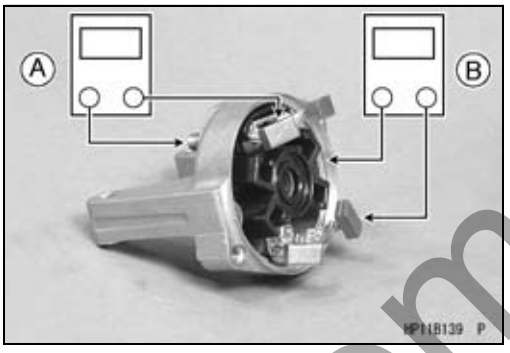
Electric Starter System

Brush Lead Inspection

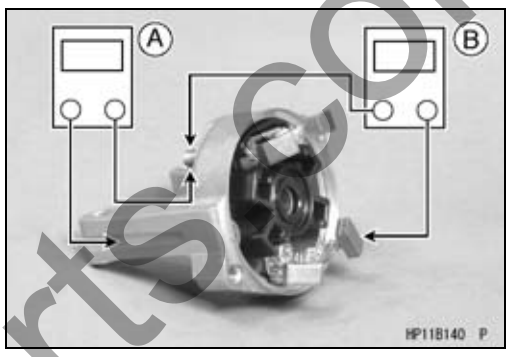


- Using the × 1 Ω hand tester range, measure the resistance as shown.
  Terminal Bolt and Positive Brushes [A]
  Right-hand End Cover and Negative Brushes [B]

  Special Tool - Hand Tester: 57001-1394

★If there is not close to zero ohms, the brush lead has an open. Replace the brush plate assy.

Right-hand End Cover Inspection

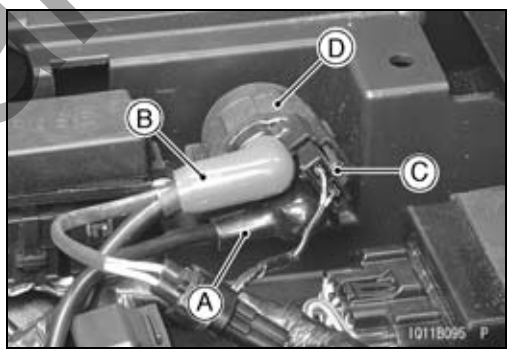


- Using the highest hand tester range, measure the resistance as shown.
  Terminal Bolt and Right-hand End Cover [A]
  Terminal Bolt and Negative Brushes [B]

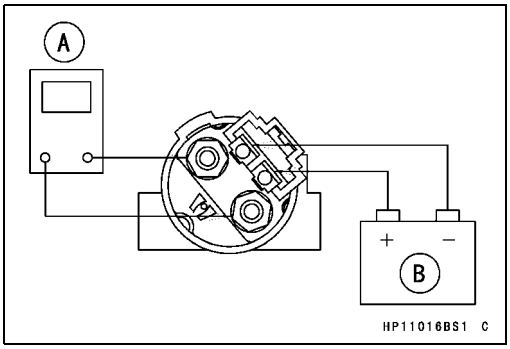
  Special Tool - Hand Tester: 57001-1394

★If there is any reading, the brush assy and/or terminal bolt assy have a short. Replace the starter motor.

Starter Relay Inspection



- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Battery (Negative Cables)
- Disconnect:
  Starter Motor Cable [A]
  Battery Positive Cable [B]
  Connector [C]
- Remove:
  Starter Relay [D]

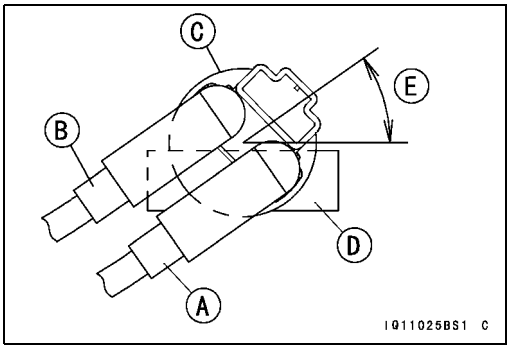


- Connect the hand tester [A] and a 12 V battery [B] to the starter relay as shown.

★If the relay does not work as specified, the relay is defective. Replace the relay.

Testing Relay
Hand Tester Range: × 1Ω range
Criteria: When battery is connected ⇒ 0 Ω
When battery is disconnected ⇒ ∞Ω

Starter Relay Installation



- Connect the cables to the starter relay [A] as follows.
  Starter Motor Cable [B]
  Battery Positive Cable [C]
  Damper [D]
  30 ~ 45° [E]

Starter Control Relay Inspection

- Refer to the Relay Inspection.

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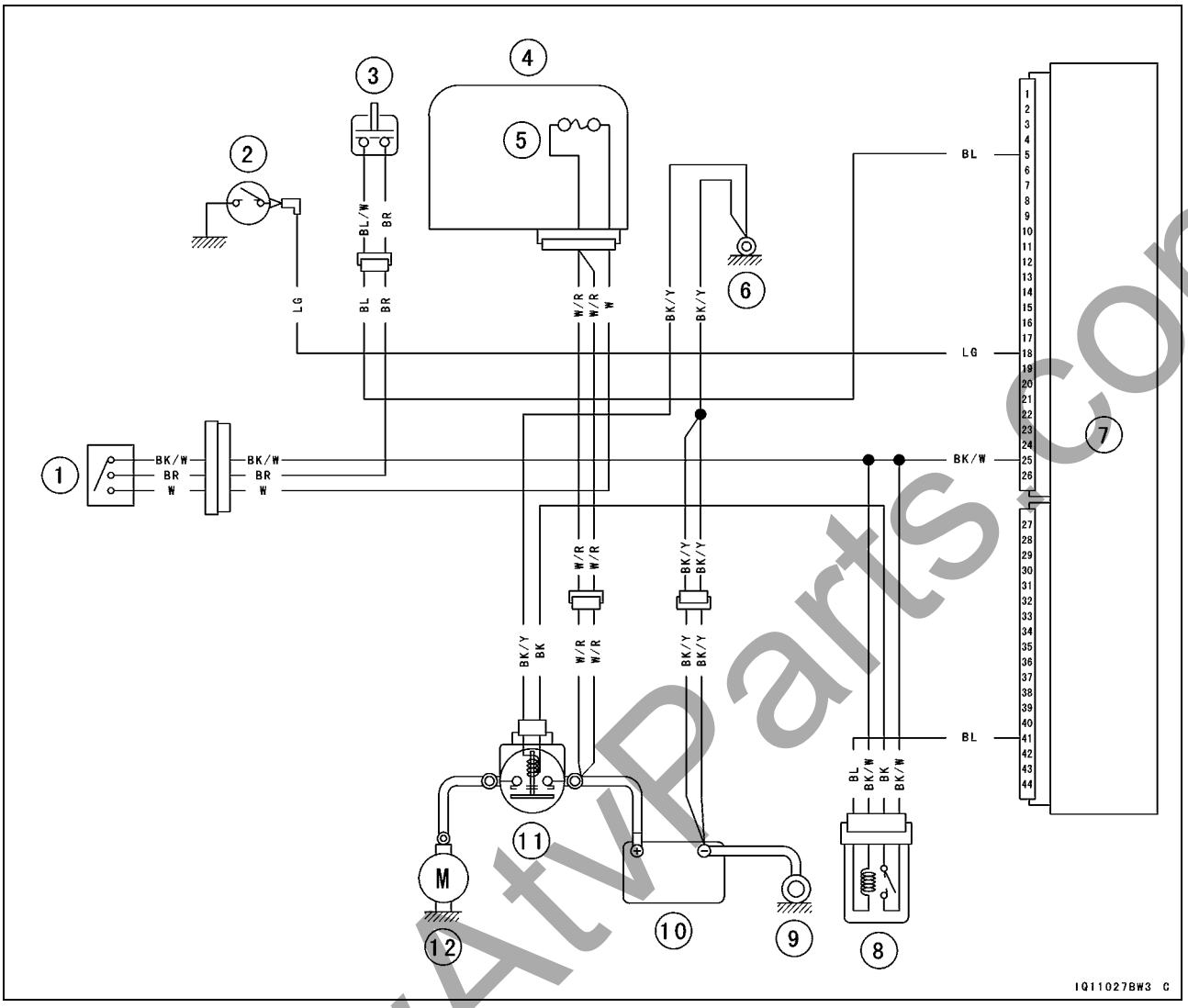
Electric Starter System

Electric Starter Circuit

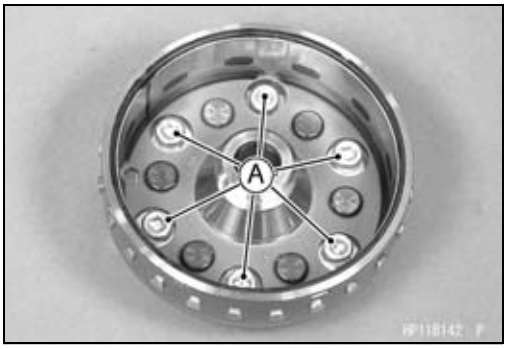


1. Ignition Switch
2. Neutral Position Switch
3. Brake Light Switch
4. Fuse Box
5. Main Fuse 30 A
6. Frame Ground 1
7. ECU (Electronic Control Unit)
8. Starter Control Relay
9. Engine Ground
10. Battery
11. Starter Relay
12. Starter Motor

Starter Motor Clutch Removal

- Remove the alternator rotor (see Alternator Rotor Removal).
- Hold the rotor with the flywheel holder and take out the starter motor clutch bolts [A].

Special Tool - Flywheel Holder: 57001-1313



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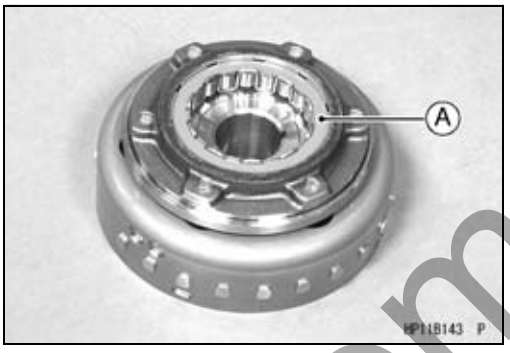
Electric Starter System

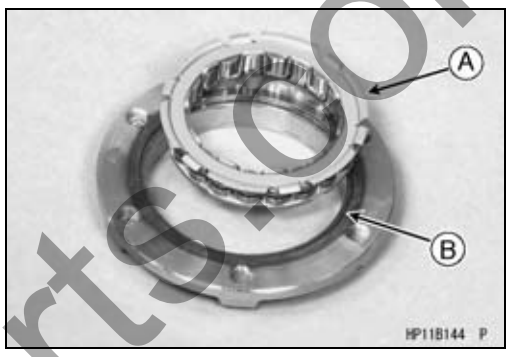
● Take out the one-way clutch [A].



Starter Motor Clutch Installation

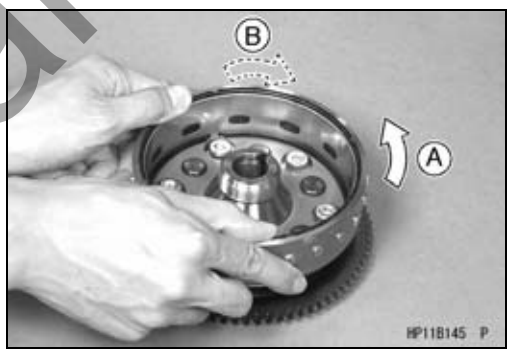
● Apply engine oil to around the cams of the one-way clutch.
● Install the one-way clutch so that the flange [A] fits on the recess [B] of the race.
● Apply a non-permanent locking agent:
Starter Motor Clutch Bolts
● Tighten:

Torque - Starter Motor Clutch Bolts: 34 N·m (3.5 kgf·m, 25 ft·lb)



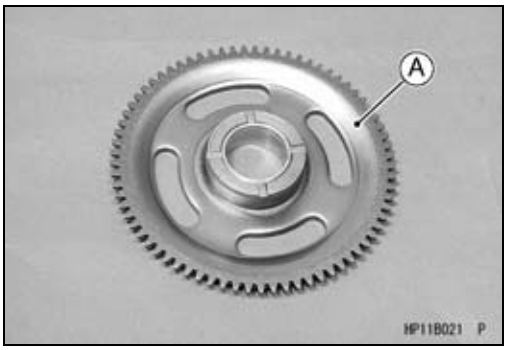
Starter Motor Clutch Inspection

● Remove:
Alternator Rotor (see Alternator Rotor Removal)
● Fit the starter clutch gear into the starter motor clutch.
★If the alternator rotor turns counterclockwise [A] freely from the starter clutch gear, but not clockwise [B], the clutch is operating correctly.
★If the clutch does not operate correctly, or if it makes noise, disassemble it and examine each part visually. Replace any worn or damaged parts.



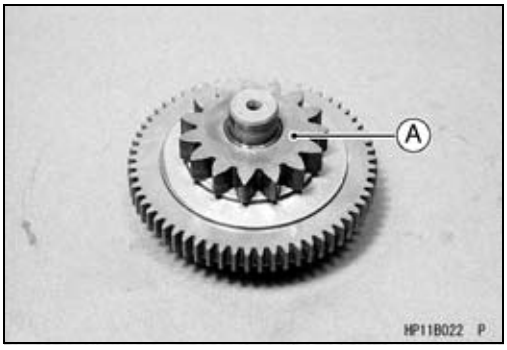
NOTE

○*Examine the starter clutch gear [A]. Replace it if it is worn or damaged.*



Torque Limiter Inspection

● Remove:
Alternator Rotor (see Alternator Rotor Removal)
● Remove the torque limiter [A] and visually inspect it.
★If the limiter has wear, discoloration, or other damage, replace it as a unit.



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Lighting System

Headlight Beam Vertical Adjustment

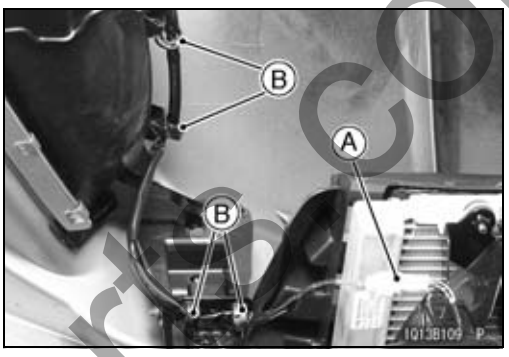
- Turn the adjusting screw [A] on each headlight rim in or out to adjust the headlight vertically.

NOTE

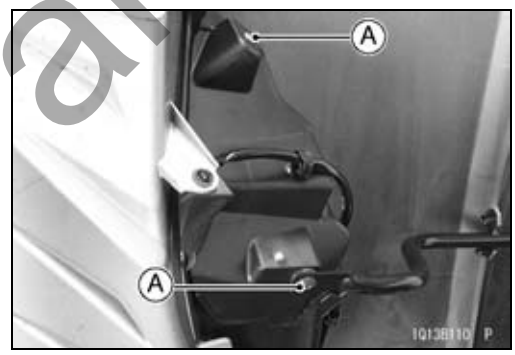
○*On high beam, the brightest point should be slightly below horizontal with the vehicle on its wheels and the rider seated. Adjust both headlights to the same angle.*

Headlight Bulb Replacement

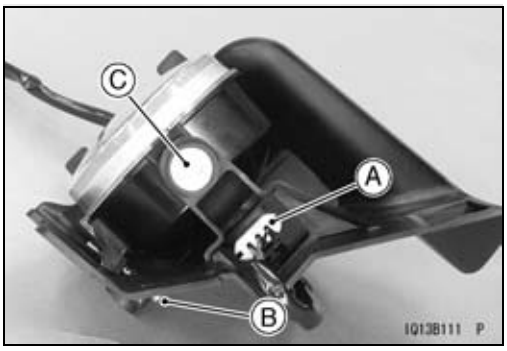
- Tilt up and hold the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove:
  Headlight Lead Connector [A]
  Clamps [B]



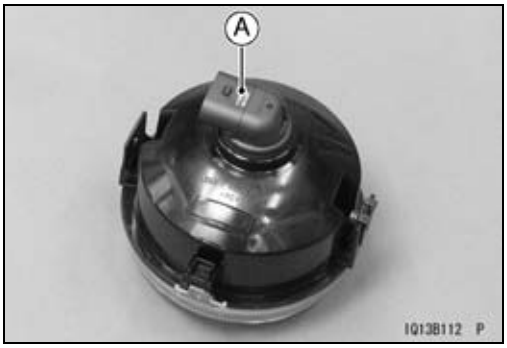
- Remove:
  Screws [A]



- Remove:
  Headlight Connector [A]
  Vertical Adjustment Screw [B], Spring, and Nut
  Bolts [C] (both sides)



- Turn the headlight bulb [A] counterclockwise and pull out the bulb from the headlight.



NOTICE

When handling the quartz-halogen bulb, never touch the glass portion with bare hands. Always use a clean cloth. Oil contamination from hands or dirty rags can reduce bulb life or cause the bulb to explode.

NOTE

○*Clean off any contamination that inadvertently gets on the bulb with alcohol or soap and water solution.*

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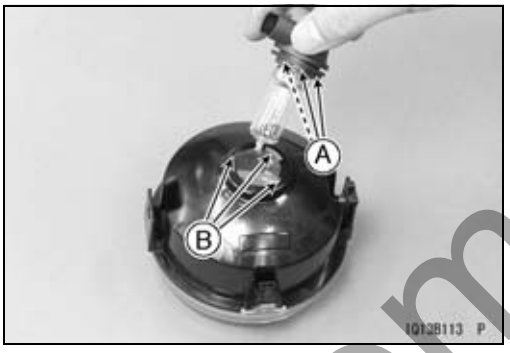
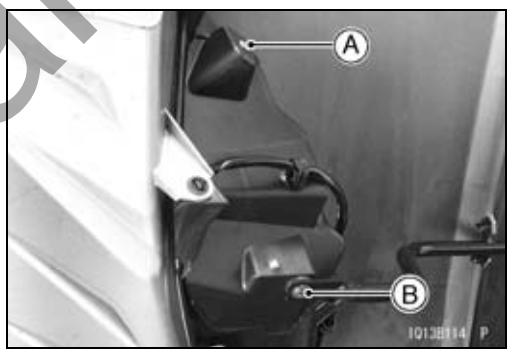
Lighting System

- Replace the headlight bulb.
- Fit the projections [A] of the bulb in the hollows [B] of the headlight.

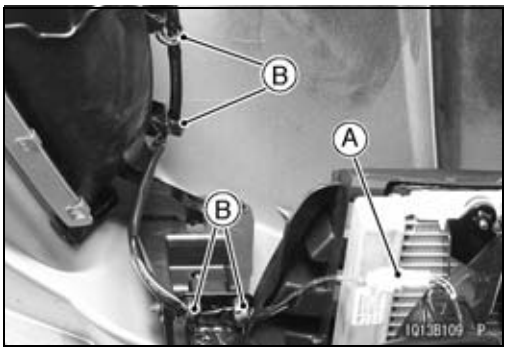


- Turn the headlight bulb [A] clockwise.

- Install the removed parts.
  [A] Screw [M5, L = 10 mm (0.39 in.)]
  [B] Screw [M6, L = 25 mm (0.98 in.)]

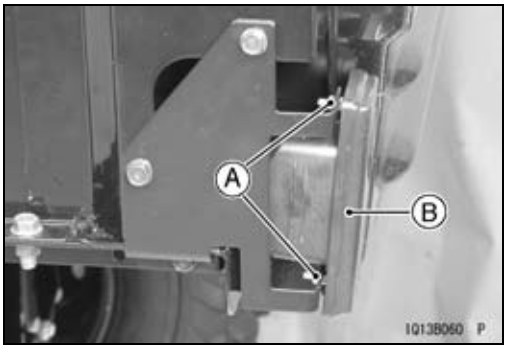


- Connect the headlight lead connector [A] and install the champs [B].
- After installation, adjust the headlight aim (see Headlight Beam Vertical Adjustment).



Tail/Brake Light Bulb Replacement

- Remove:
  Rear Fender (see Rear Fender Removal in the Frame chapter)
  Tail/Brake Light Mounting Nuts [A] and Washers
  Tail/Brake Light Assembly [B]



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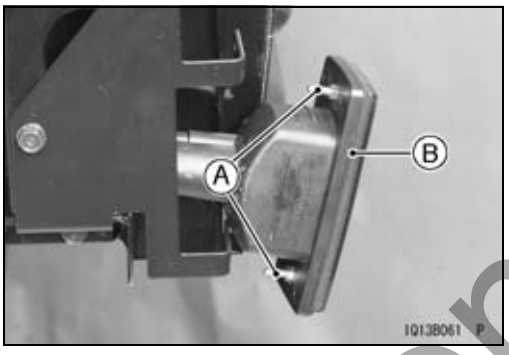
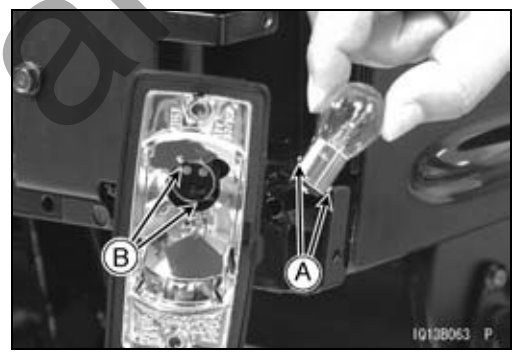
Lighting System

● Remove:
Tail/Brake Light Lens Mounting Screws [A] and Nuts
Tail/Brake Light Lens [B]

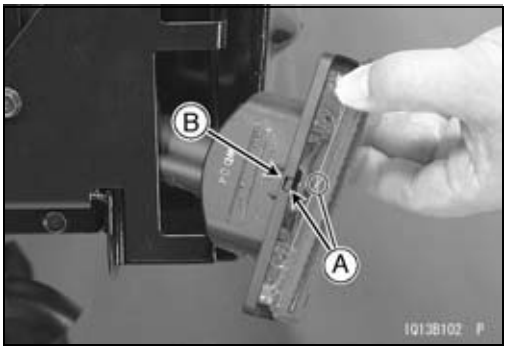


● Push and turn the bulb [A] counterclockwise and remove it.
○Turn the bulb about 15°.

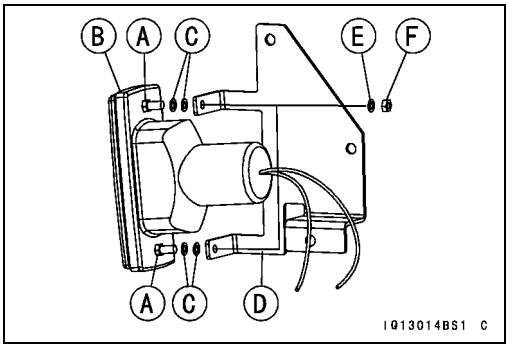
● Insert the new bulb by aligning its upper and lower pins [A] with the upper and lower grooves [B] in the socket, and turn the bulb clockwise.



● Fit the projections [A] of the gasket and lens into the recess [B] of the housing.



● Install:
Screws and Nuts (Part No. 92015-1550) [A]
○Install the nuts so that the flat side faces to the housing [B].
● Install:
Washers [C]
Bracket [D]
Washers [E] and Nuts (Part No. 311AA0400) [F]
● Install the removed parts.



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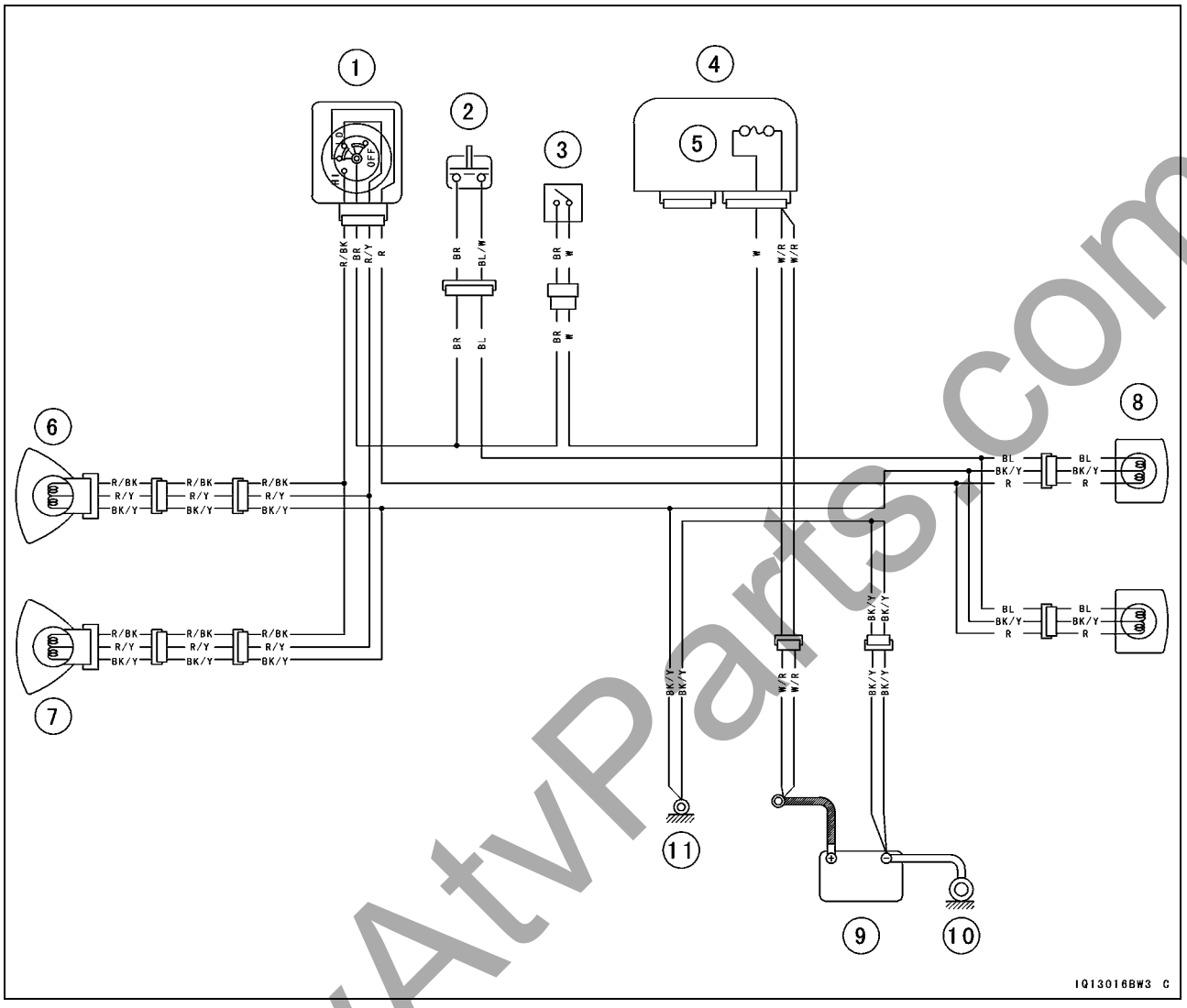
Lighting System

Lighting System Circuit



1. Lighting Switch
2. Brake Light Switch
3. Ignition Switch
4. Fuse Box
5. Main Fuse 30 A
6. Headlight (Right) 12 V 35/35 W
7. Headlight (Left) 12 V 35/35 W
8. Brake/Tail Lights 12 V 27/8 W
9. Battery
10. Engine Ground
11. Frame Ground 1

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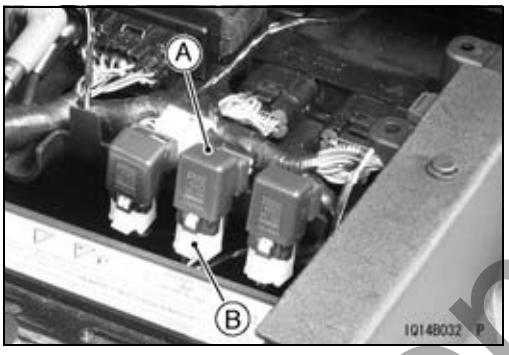
Radiator Fan System

Radiator Fan Circuit Inspection



- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Radiator Fan Relay [A]
- Disconnect the 4-pin connector [B].

- Using an auxiliary leads [A], connect BL/R and BL/W terminals in the relay lead connector of the harness side.

NOTE

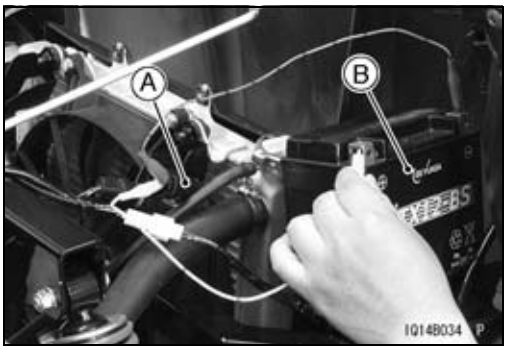
○*The ignition switch need not be turned on.*

★If the fan does not rotate, inspect the following.
  Main Fuse 30 A
  Radiator Fan Breaker (see Radiator Fan Breaker Inspection)
  Fan Motor (see Fan Motor Inspection)

★When the fan system is abnormal even if the above inspection is normal, check the following items.
  Water Temperature Sensor (see Water Temperature Sensor Inspection)
  Radiator Fan Relay (see Relay Circuit Inspection)
  Wiring (see Wiring Inspection)

★If their parts are normality, replace the ECU (see ECU Removal/Installation in the Fuel System (DFI) chapter).

Radiator Fan Motor Inspection

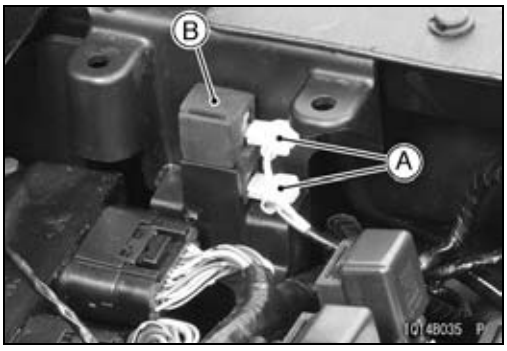


- Lift and hold the front fender (see Front Fender Removal in the Frame chapter).
- Disconnect the connector [A] in the fan lead.
- Using two auxiliary wires, supply battery [B] voltage to the fan motor.

★If the fan does not rotate, the fan motor is defective and must be replaced.

Radiator Fan Motor Leads
BL → Battery (+)
BK → Battery (–)

Radiator Fan Breaker Inspection



- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
  Connectors [A] (disconnect)
  Radiator Fan Breaker [B]

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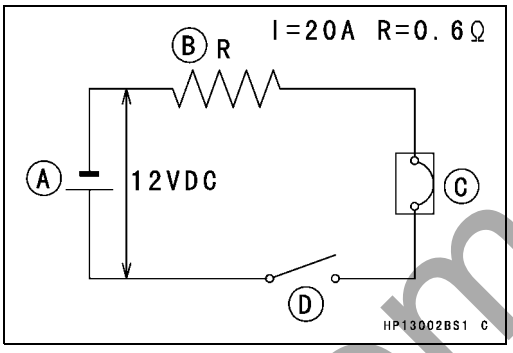
Radiator Fan System



- Inspect the breaker for operation.
- Connect:
  12 V Battery [A]
  0.6 Ω Resistance [B]
  Radiator Fan Breaker [C]
  Switch [D]

★If the circuit in the breaker will not open within 60 seconds, replace the breaker.

- When resetting the breaker, push the reset button after ten seconds or more pass.

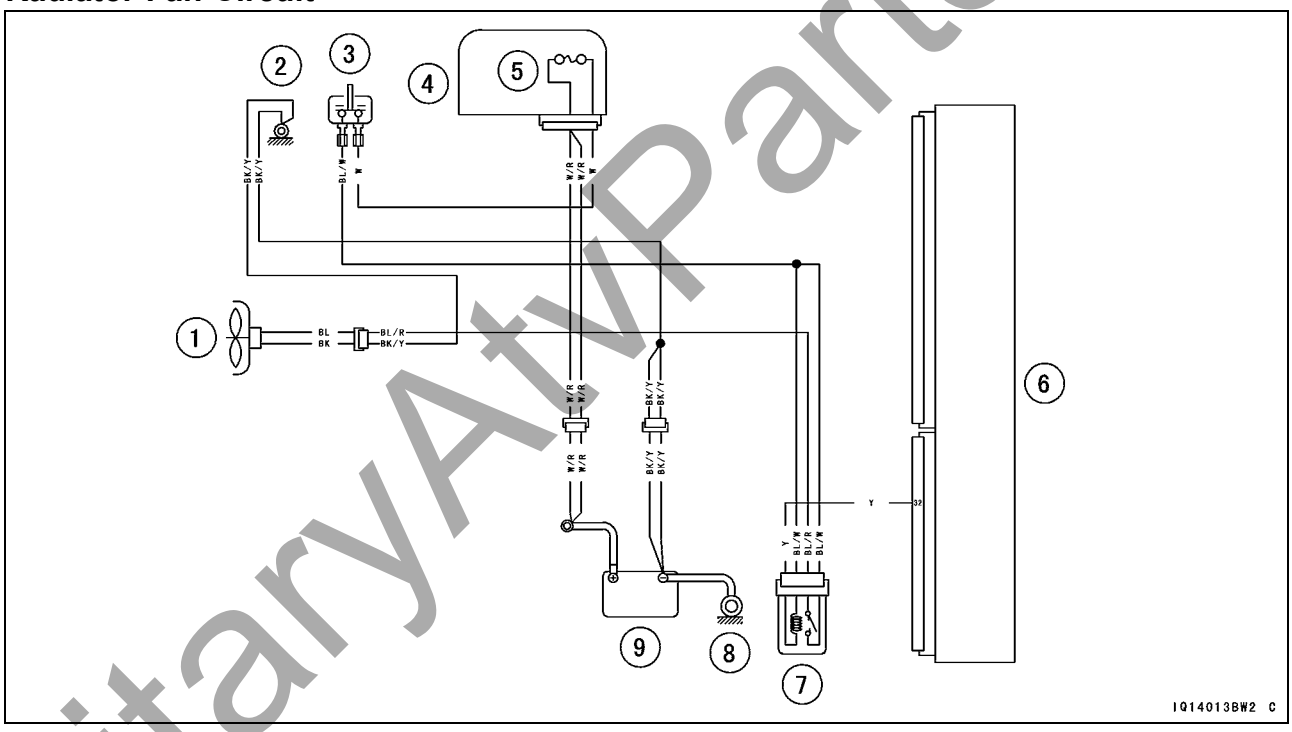
Radiator Fan Breaker Installation

- Connect the radiator fan breaker lead connector.
- Install:
  Radiator Fan Breaker

Radiator Fan Relay Inspection

- Refer to the Relay Inspection.

Radiator Fan Circuit



1. Radiator Fan Motor
2. Frame Ground 1
3. Radiator Fan Breaker
4. Fuse Box
5. Main Fuse 30 A
6. ECU
7. Radiator Fan Relay
8. Engine Ground
9. Battery

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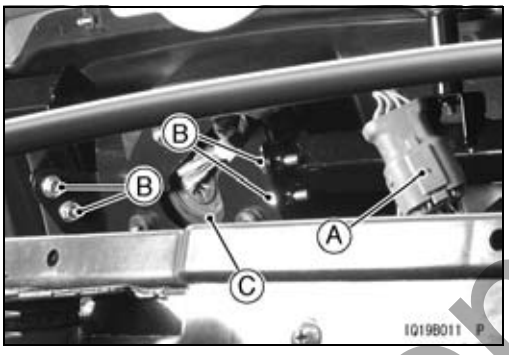
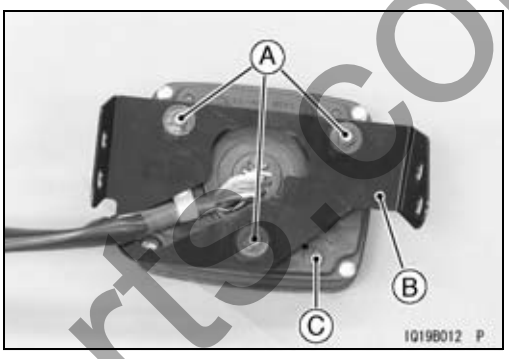
Meter

Multifunction Meter Unit Removal

- Tilt up the front fender front (see Front Fender Front Removal in the Frame chapter).
- Remove the cover (see Front Fender Rear Removal in the Frame chapter).
- Disconnect:
  Meter Lead Connector [A]
- Remove:
  Meter Bracket Bolts [B]
  Meter Assembly [C] and Upper Damper



- Remove:
  Multifunction Meter Mounting Nuts [A] and Washers
  Meter Bracket [B]
  Multifunction Meter Unit [C]

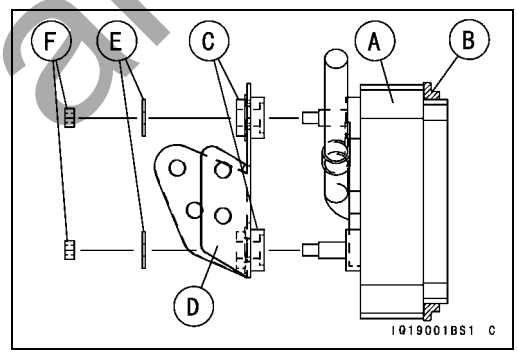


NOTICE

Do not drop the meter unit.

Multifunction Meter Unit Installation

- Install:
  Multifunction Meter Unit [A]
  Upper Damper [B]
  Lower Dampers [C]
  Bracket [D]
  Washers [E]
  Multifunction Meter Mounting Nuts [F]



- Install:
  Meter Assembly and Upper Damper
  Meter Bracket Screws
- Connect:
  Meter Lead Connector
- Install:
  Cover (see Front Fender Rear Installation in the Frame chapter)

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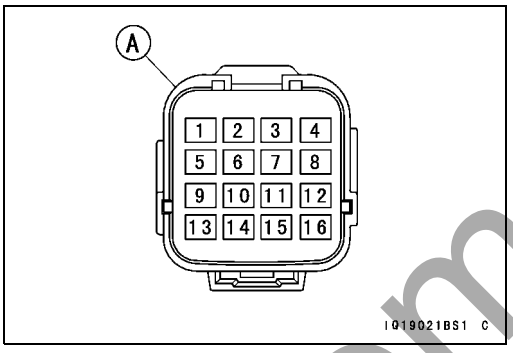
Meter

Multifunction Meter Unit Inspection

● Remove:
Multifunction Meter Unit (see Multifunction Meter Unit Removal)

NOTICE

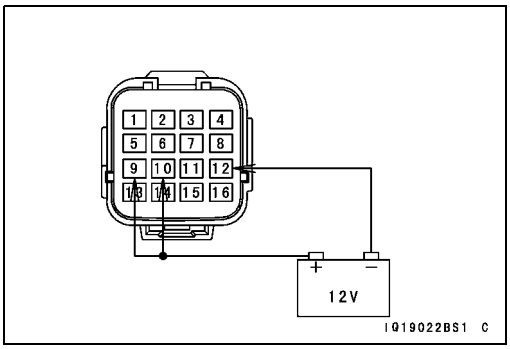
Do not drop the meter unit.



[A] Meter Unit Lead Connectors
[1] Speed Sensor Pulse
[2] Belt Indicator Light (LED) (–)
[3] Water Temperature Warning Symbol (–)
[4] 2WD/4WD Position Indicator Symbols (LCD) (–)
[5] Fuel Level Gauge Segments (LCD)
[6] Meter Illumination (+)
[7] Reverse Indicator Light (LED) (–)
[8] Neutral Indicator Light (LED) (–)
[9] Ignition (+)
[10] Battery (+)
[11] Oil Pressure Warning Indicator Light (LED) (–)
[12] Battery (–)
[13] Parking Brake Indicator Symbol (LED) (–)
[14] FI Indicator Symbol (LCD)
[15] Unused
[16] Unused
LED: Light Emitting Diode
LCD: Liquid Crystal Display

Check 1: LCD Segments Check

● Using auxiliary wires, connect a 12 V battery to the meter unit connector as follows.
● Connect the battery positive (+) terminal to terminal [10].
● Connect the battery negative (–) terminal to terminal [12].
● Connect terminal [9] to the battery (+) terminal.
○When the terminal [9] is connected, all the LCD segments appear for one second.
○When the terminal [9] is disconnected, all the LCD segments disappear.
★If the display function does not work, replace the meter unit.



NOTE

○*When the oil switch is turned off, the hour meter begins count.*
○*Therefore, when connecting the check 1 circuit, the hour meter begins count because the circuit of the oil switch is opened.*
○*To stop the count of the hour meter, connect the battery negative (–) terminal to terminal [11] (see Check 12).*
○*The hour meter cannot be reset.*

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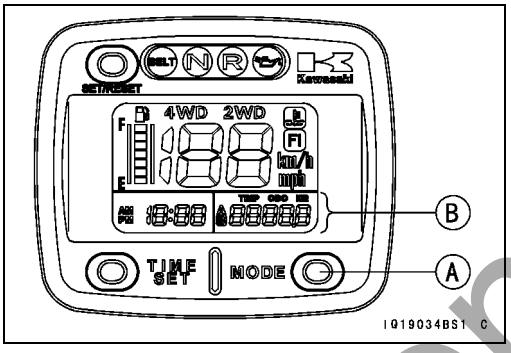
Meter

Check 2: MODE and TIME SET Buttons Operation Check

- Connect the wires in the same manner as Check 1.
- Check that when the MODE button [A] is pushed and held continuously, the display [B] cycles through the three modes.

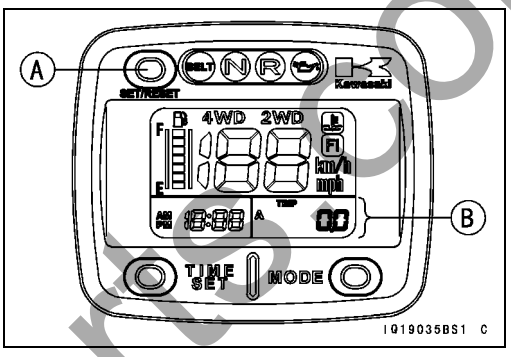
ODO → TRIP A → TRIP B → Hour → ODO

★If the display function does not work, replace the meter unit.



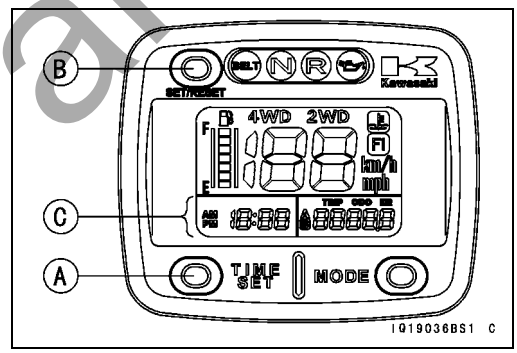
- Cycle the meter to TRIP A or TRIP B mode.
- Check that when the SET/RESET button [A] is pushed, the display turns to 0.0.

★If the display function does not indicate 0.0 [B], replace the meter unit.



- Check that when the TIME SET [A] and SET/RESET [B] buttons are pushed, the time [C] will reset.

★If the meter function does not work, replace the meter unit.

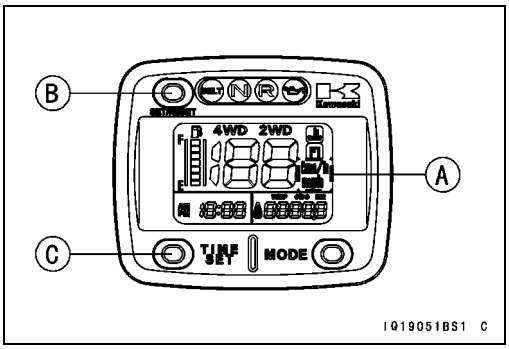


- Indicate the ODO mode.
- Check that the display [A] change to the mile and km display each time by pushing the SET/RESET [B] bottom while MODE [C] bottom pushed in.

NOTE

○*Mile/Km Display can alternate between English and metric modes (mile and km) in the digital meter. Make sure that km or mile according to local regulations is correctly displayed before riding.*

★If the display function does not work and adjust, replace the meter unit.



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Meter

Check 3: Speedometer Check

- Connect the wires in the same manner as Check 1.
- The speed equivalent to the input frequency is indicated in the oscillator [A], if the square wave is input into terminal [1].

○Indicates approximately 40 mph if the input frequency is approximately 789 Hz.

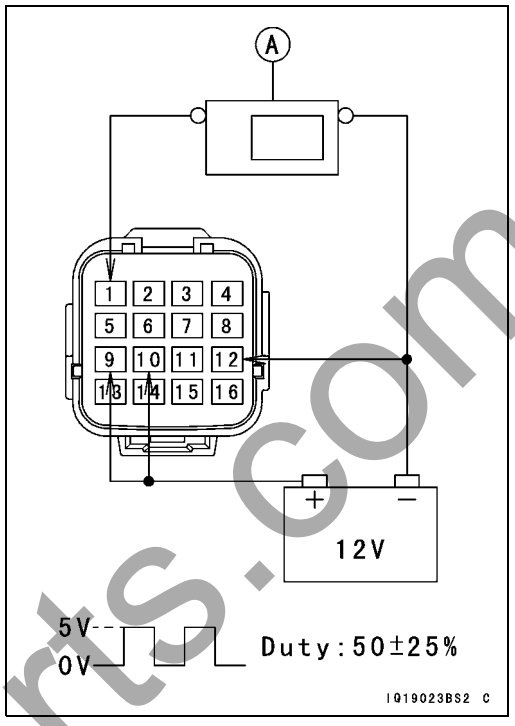
○Indicates approximately 40 km/h if the input frequency is approximately 526 Hz.

★If the meter function does not work, replace the meter unit.

NOTE

○*The input frequency of the oscillator adds the integrated value of the odometer.*

○*The integrated value of the odometer cannot be reset.*



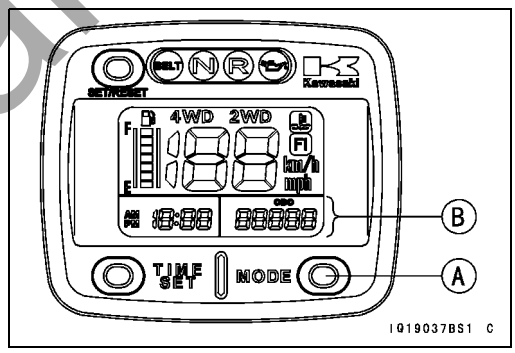
Check 4: Odometer Check

- Connect the wires in the same manner as Check 3.
- Pushing the MODE button [A], cycle the odometer [B].
- Raise the input frequency of the oscillator to see the result of this inspection.

★If the value indicated by the odometer does not increase, replace the meter unit.

NOTE

○*The integrated value of the odometer cannot be reset.*



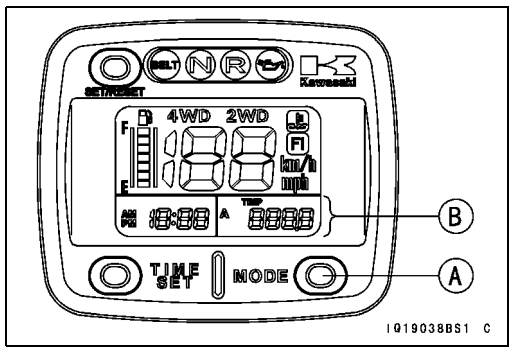
Check 5: Trip Meter A/B Check

- Connect the wires in the same manner as Check 3.
- Pushing the MODE button [A], cycle the trip meter A or B [B].
- Raise the input frequency of the oscillator to see the result of this inspection.

★If the value indicated by the trip meter A or B does not increase, replace the meter unit.

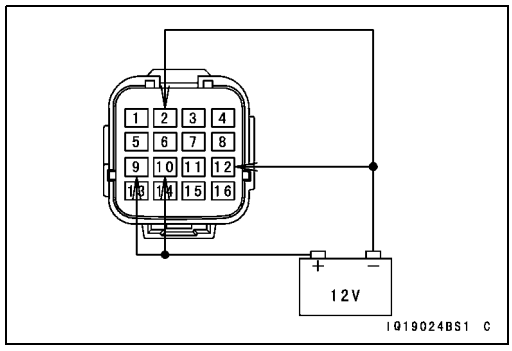
NOTE

○*The integrated value of the odometer cannot be reset.*



Check 6: Belt Check Indicator Light Check

- Connect the wires in the same manner as Check 1.
- Connect terminal [2] to the battery (–) terminal.



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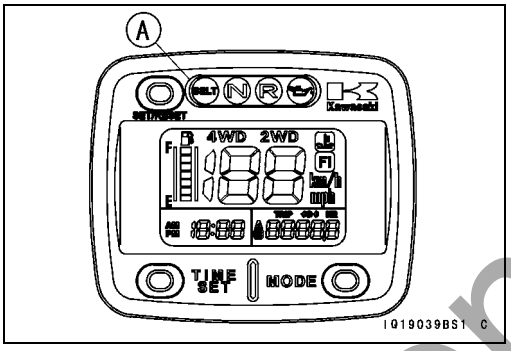
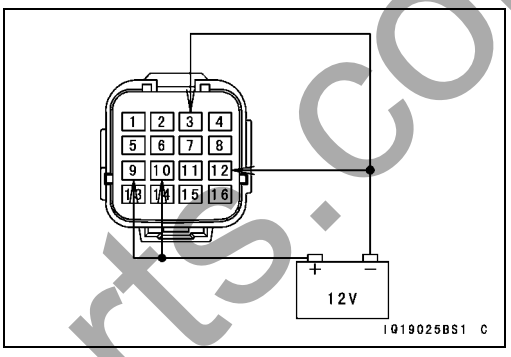
Meter

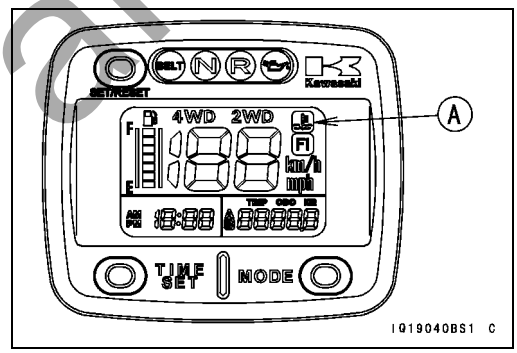
○The belt check indicator light (LED) [A] should go on.
★If the LED light does not go on, replace the meter unit.



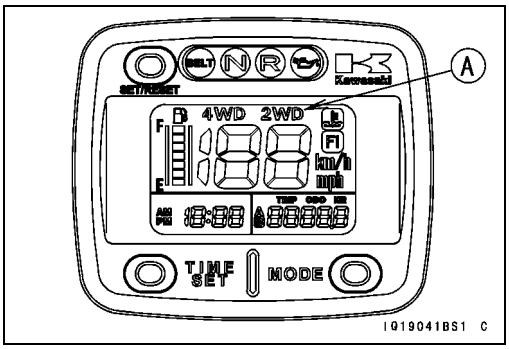
Check 7: Water Temperature Warning Symbol Check
● Connect the wires in the same manner as Check 1.
● Connect terminal [3] to the battery (–) terminal.



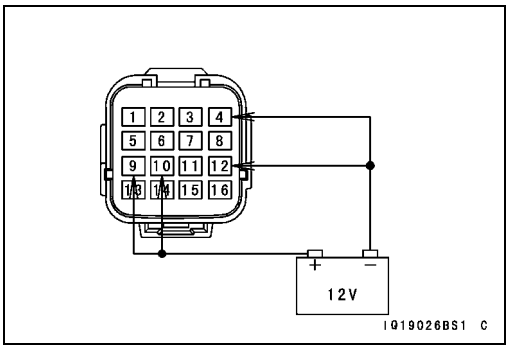
○The water temperature warning symbol (LCD) [A] should flash.
★If the symbol does not flash, replace the meter unit.



Check 8: 2WD/4WD Indicator Symbols Check
● Connect the wires in the same manner as Check 1.
○The 2WD indicator Symbol (LCD) [A] should appear.



● Connect terminal [4] to the battery (–) terminal.



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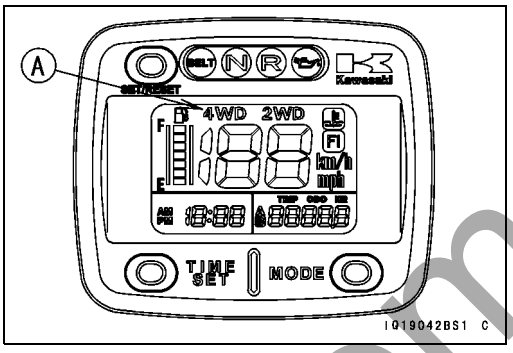
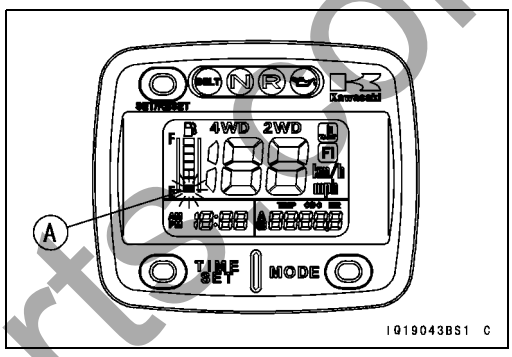
Meter

○The 4WD indicator Symbol (LCD) [A] should appear.
★If the display function does not work, replace the meter unit.



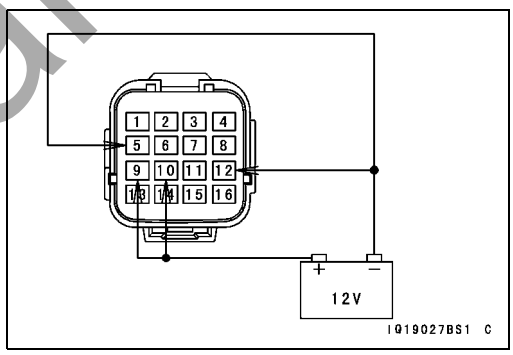
Check 9: Fuel Level Gauge Check
● Connect the wires in the same manner as Check 1.
○The first segment (LCD) [A] should flash.
★It the segment (LCD) does not flash, replace the meter unit.



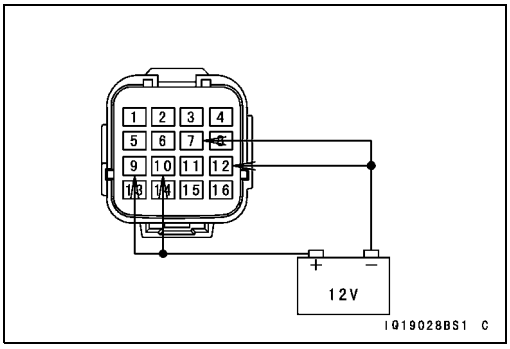
● Connect terminal [5] to the battery (–) terminal.
○When terminal [5] is connected, one segment in the fuel gauge should appear every 15 seconds.

NOTICE
When all segments appeared, disconnect the terminal [5].

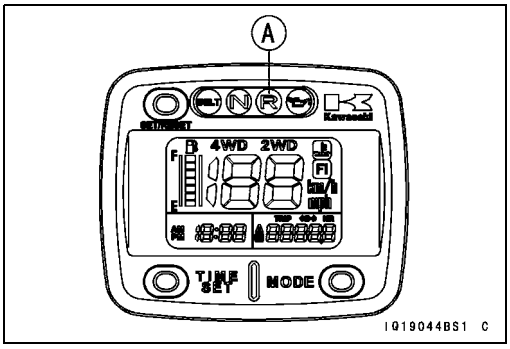
★If the display function does not work, replace the meter unit.



Check 10: Reverse Indicator Light Check
● Connect the wires in the same manner as Check 1.
● Connect terminal [7] to the battery (–) terminal.



○The reverse indicator light (LED) [A] should go on.
★If the LED light does not go on, replace the meter unit.



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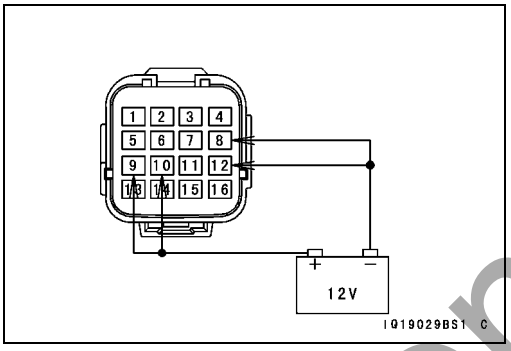
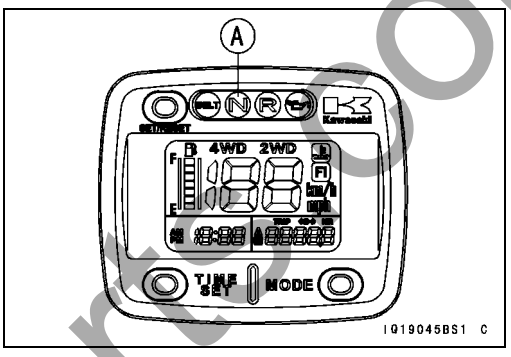
Meter

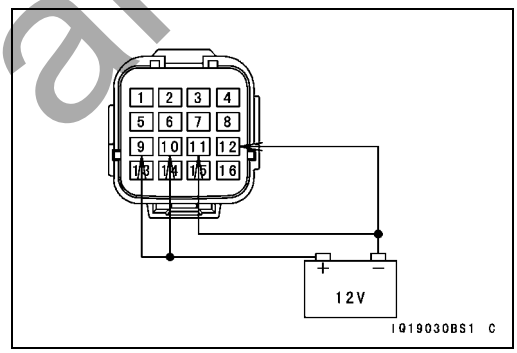
Check 11: Neutral Indicator Light Check
- Connect the wires in the same manner as Check 1.
- Connect terminal [8] to the battery (–) terminal.



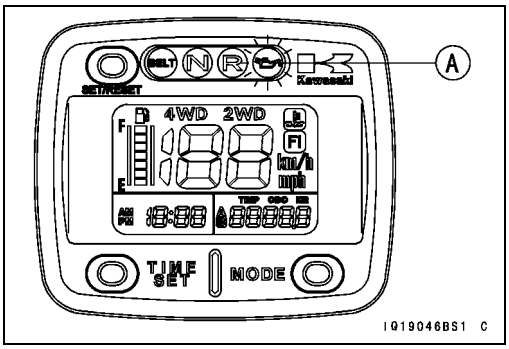
○The neutral indicator light (LED) [A] should go on.
★If the LED light does not go on, replace the meter unit.



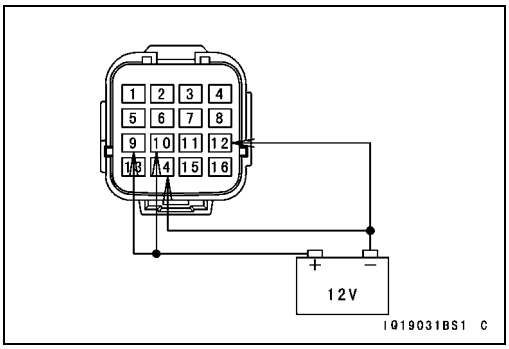
Check 12: Oil Pressure Warning Light Check
- Connect the wires in the same manner as Check 1.
- Connect terminal [11] to the battery (–) terminal.



○The oil pressure warning light (LED) [A] should flash.
★If the LED light does not flash, replace the meter unit.



Check 13: FI Indicator Light Check
- Connect the wires in the same manner as Check 1.
- Connect terminal [14] (R/Y) to the battery (–) terminal.



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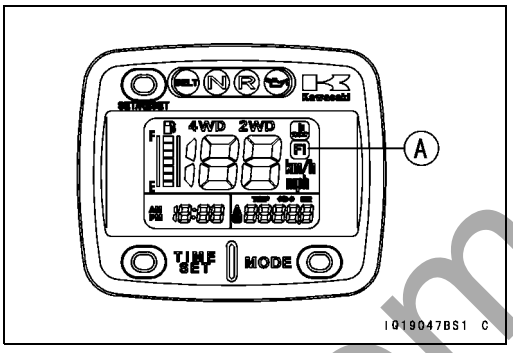
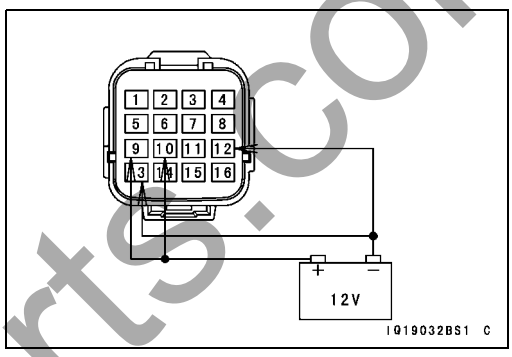
Meter

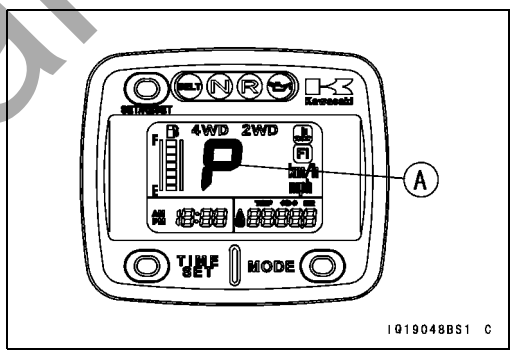
○The FI indicator symbol (LCD) [A] should go on for 3 seconds, and flash after that.
★If the symbol does not flash, replace the meter unit.



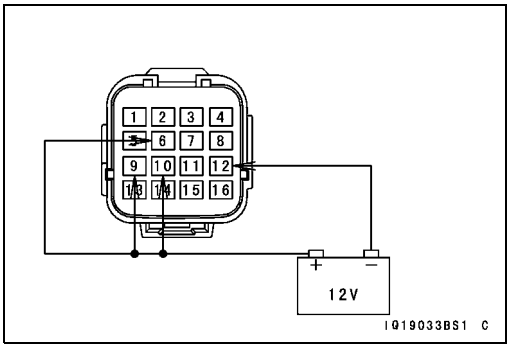
Check 14: Parking Brake Indicator Symbol Check
● Connect the wires in the same manner as Check 1.
● Connect terminal [13] (G) to the battery (–) terminal.



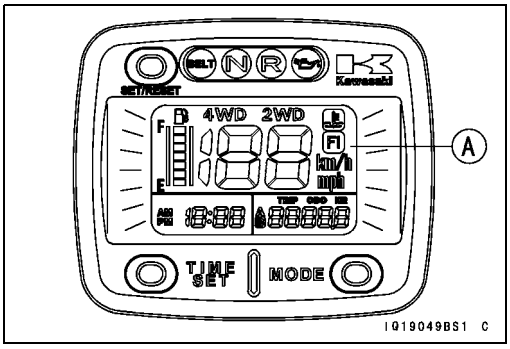
○The parking brake indicator symbol “P” (LCD) [A] should appear.
★If the symbol does not appear, replace the meter unit.



Check 15: Meter Illumination Check
● Connect the wires in the same manner as Check 1.
● Connect terminal [6] to the battery (+) terminal.



○The meter illumination [A] should go on.
★If the illumination does not go on, replace the meter unit.



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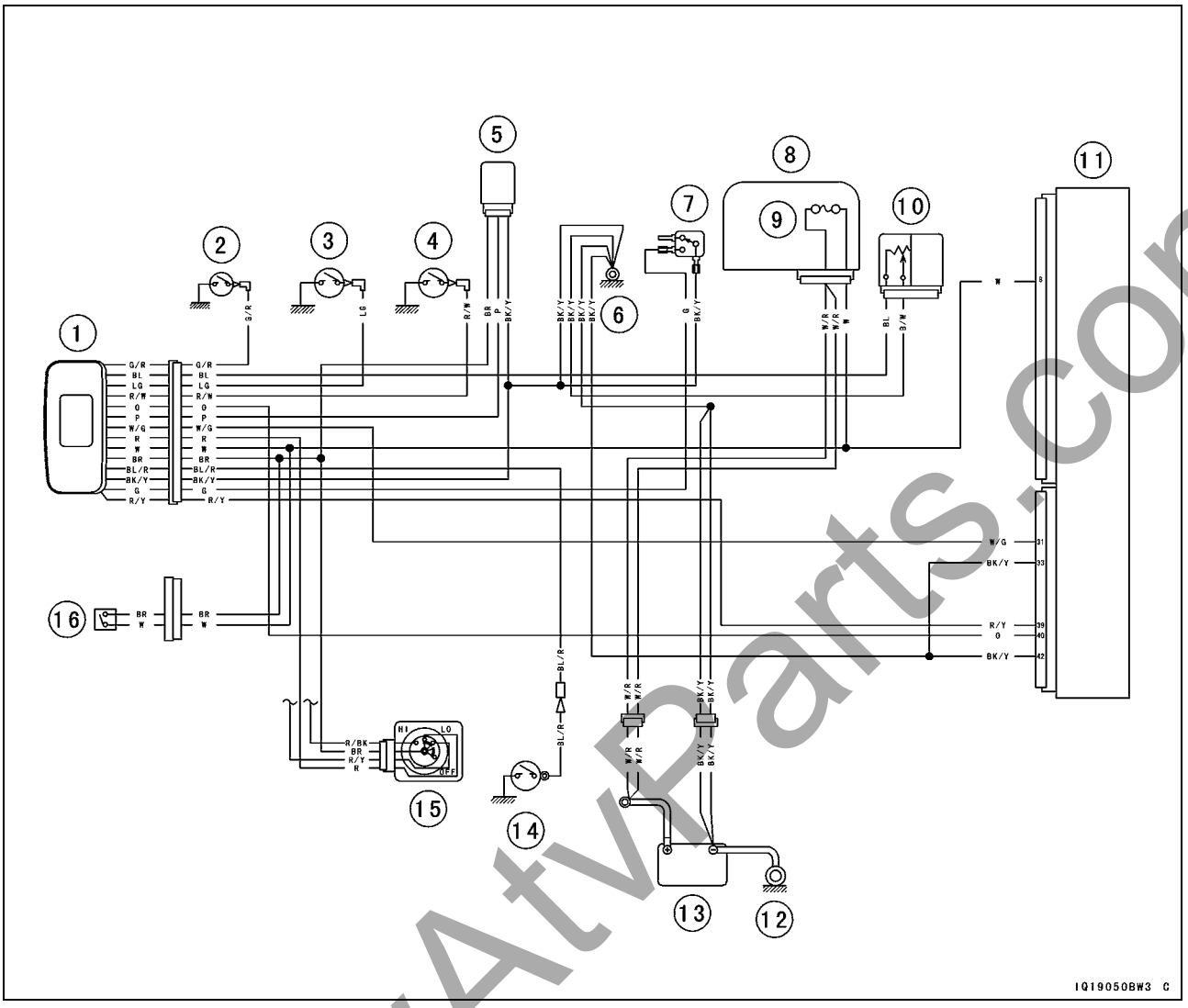
Meter

Meter Circuit



1. Multifunction Meter
2. 4WD Position Switch
3. Neutral Position Switch
4. Reverse Position Switch
5. Speed Sensor
6. Frame Ground 1
7. Parking Brake Light Switch
8. Fuse Box
9. Main Fuse 30 A
10. Fuel Level Sensor
11. ECU
12. Engine Ground
13. Battery
14. Oil Pressure Switch
15. Lighting Switch
16. Ignition Switch

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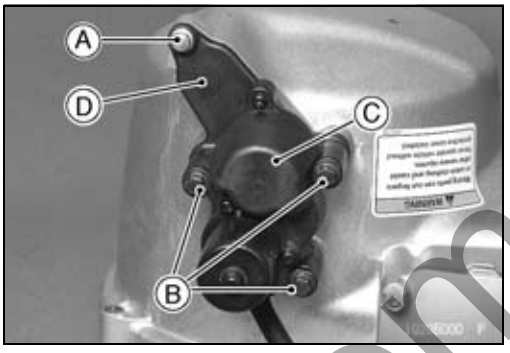
Actuator Control System

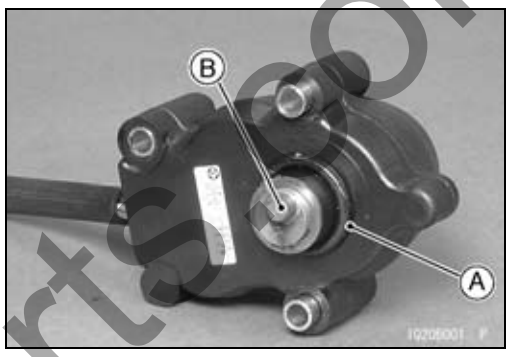
Engine Brake Actuator Removal

- Remove:
  Torque Converter Cover (see Torque Converter Cover Removal in the Converter System chapter)
  Actuator Cover Bolt [A]
  Actuator Mounting Bolts [B]
  Actuator [C]
  Actuator Cover [D]

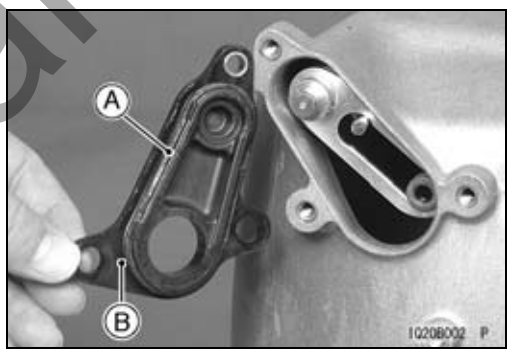


Engine Brake Actuator Installation

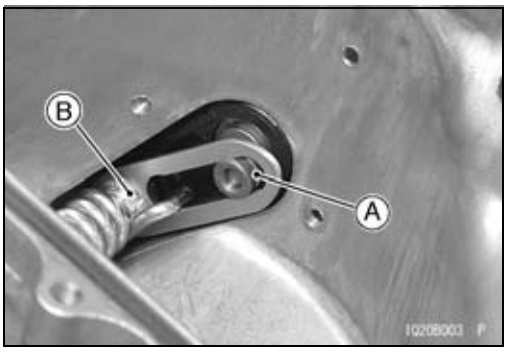
- Apply grease and Install:
  O-ring [A]
- Apply molybdenum disulfide grease to the pin [B].



- Apply grease to the trim seal [A] and install the cover [B].

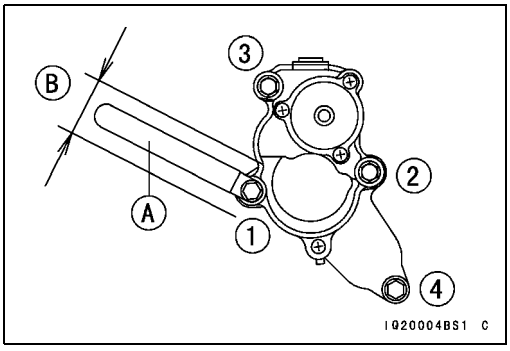


- Insert the pin into the collar [A] of the engine brake lever assembly [B].
- Wipe off any protruding grease.



- Install the clamp [A] in this area [B] (about 30 mm (1.2 in.)).
- Tighten the actuator mounting bolts following the tightening sequence [1 ~ 4].

Torque - Engine Brake Actuator Mounting Bolts: 8.8 N·m (0.90 kgf·m, 78 in·lb)
Engine Brake Actuator Cover Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)



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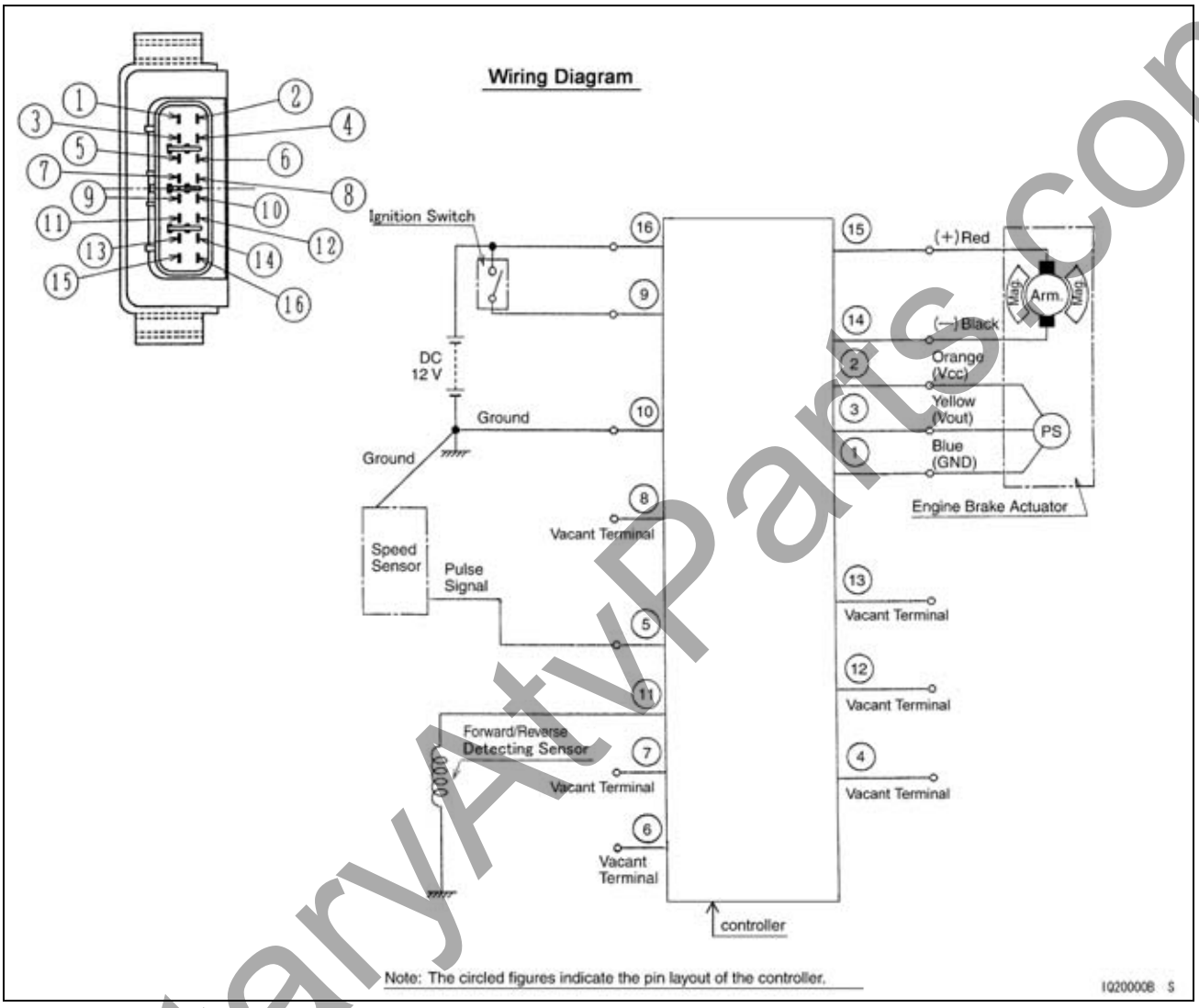
Actuator Control System

Actuator Control System Outline

The actuator controller has a microprocessor that detects vehicle speed, ignition switch, and the forward/reverse movement of the vehicle in order to control the engine brake actuator.

Actuator Control System



Engine Brake Actuator Inspection

- Remove:

Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)

Actuator Lead Connector [A]

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Actuator Control System

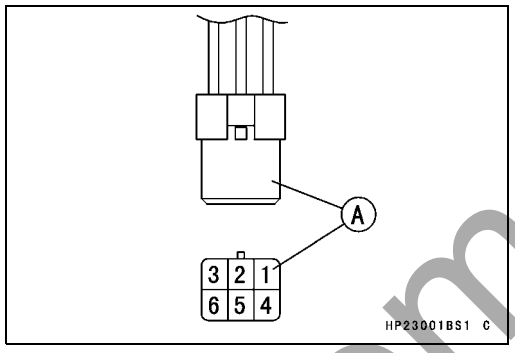
● Measure the resistance between the following terminals in the actuator lead connector [A].

Special Tool - Hand Tester: 57001-1394

Actuator Internal Resistance

4 (Red) - 6 (Black):	**3 ~ 15 Ω**
1 (Orange) - 3 (Blue):	**3.5 ~ 6.5 kΩ**
2 (Yellow) - 3 (Blue):	**630 ~ 5 330 Ω**

★If any reading is not within the specified range, replace the engine brake actuator.



Speed Sensor Circuit Inspection

NOTE

○*Be sure the battery is fully charged.*

● Support the vehicle on a stand or a jack so that the wheels are off the ground.
● Remove:
Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
● Connect:
Controller Connector [A]
Hand Tester [B] (range: DC 25 V)
Tester (+) → Connector (P) Terminal [5]
Tester (–) → Connector (BK/Y) Terminal [10]

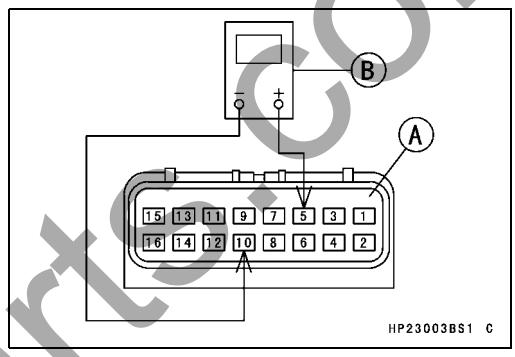
○Install the needle adapters on the tester leads.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

● Turn ON the ignition switch.
● Spin a rear wheel, measure the voltage.

Speed Sensor Output Voltage
Standard: repeat from 0 to 5 V

★If the reading is not standard, check the wiring.
★If the wiring is good, check the speed sensor (see Speed Sensor Inspection).



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Actuator Control System

Controller Unit Inspection

NOTE

○*Be sure the battery is fully charged.*

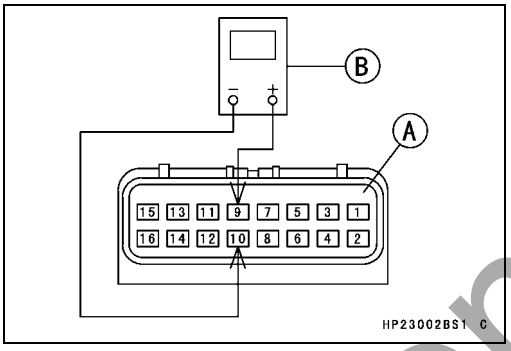
● Remove:
Seat Lower Cover (see Seat Lower Cover Removal in the Frame chapter)
● Connect:
Controller Connector [A]
Hand Tester [B] (range: DC 25 V)
Tester (+) → Connector (BR) Terminal [9]
Tester (–) → Connector (BK/Y) Terminal [10]
○Install the needle adapters on the tester leads.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

● Turn ON the ignition switch.

Controller Power Supply Voltage
Standard: near Battery Voltage

★If the reading is not battery voltage, check the wiring harness, 30 A fuse, or ignition switch.



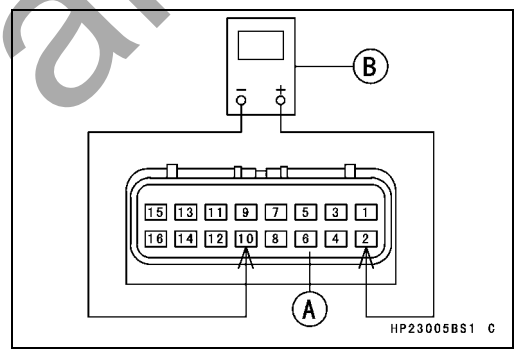
● Connect:
Controller Connector [A]
Hand Tester [B] (range: DC 10 V)
Tester (+) → Connector (O) Terminal [2]
Tester (–) → Connector (BK/Y) Terminal [10]
○Install the needle adapters on the tester leads.

Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

● Turn ON the ignition switch.
● Measure the controller output voltage for the actuators.

Controller Output Voltage (to Actuators)
Standard: 4.8 ±0.2 V

★If the reading is not standard, replace the actuator controller unit.



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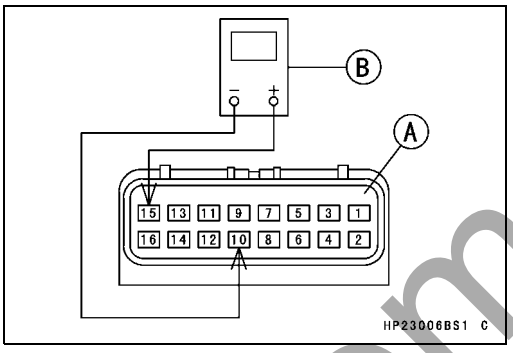
Actuator Control System



- Support the vehicle on a stand or a jack so that the wheels are off the ground.
- Connect:
  Controller Connector [A]
  Hand Tester [B] (range: DC 25 V)
  Tester (+) → Connector (W/R) Terminal [15]
  Tester (–) → Connector (BK/Y) Terminal [10]

○Install the needle adapters on the tester leads.

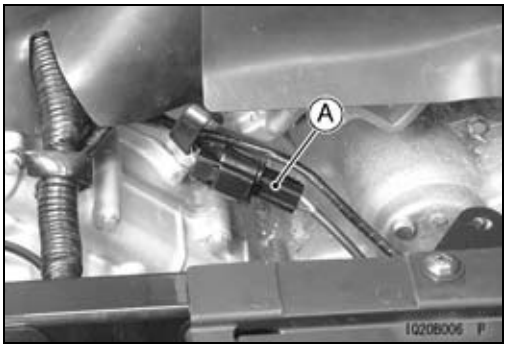
Special Tools - Hand Tester: 57001-1394
Needle Adapter Set: 57001-1457

- Turn ON the ignition switch.
- Spin a rear wheel as forward rotation.
- After the wheels stop and one second elapses, turn OFF the ignition switch.
- After two seconds elapses, measure the controller output voltage for the engine brake actuator until the actuator stops.

Controller Output Voltage (to engine brake actuator)
Standard: 5 ~ 12 V

★If the reading is not standard, check the forward/reverse detecting sensor.
★If the forward/reverse detecting sensor is normal, replace the actuator controller unit.

Forward/Reverse Detecting Sensor Inspection



- Remove:
  Engine Upper Cover (see Engine Upper Cover Removal in the Frame chapter)
- Disconnect forward/reverse detecting sensor lead connector [A].
- Measure the forward/reverse detecting sensor resistance.

○Connect the hand tester between the BK lead and the W lead.
○Set the tester to the × 10 Ω range.

Special Tool - Hand Tester: 57001-1394

Forward/Reverse Detecting Sensor Resistance
Standard: 1.2 ~ 1.6 kΩ

★If the reading is not within the specified range, replace the forward/reverse detecting sensor.

- Using the highest resistance, measure the resistance between forward/reverse detecting sensor leads and chassis ground.

★If the tester reading is less than infinity (∞) indicates a short, replace the forward/reverse detecting sensor.

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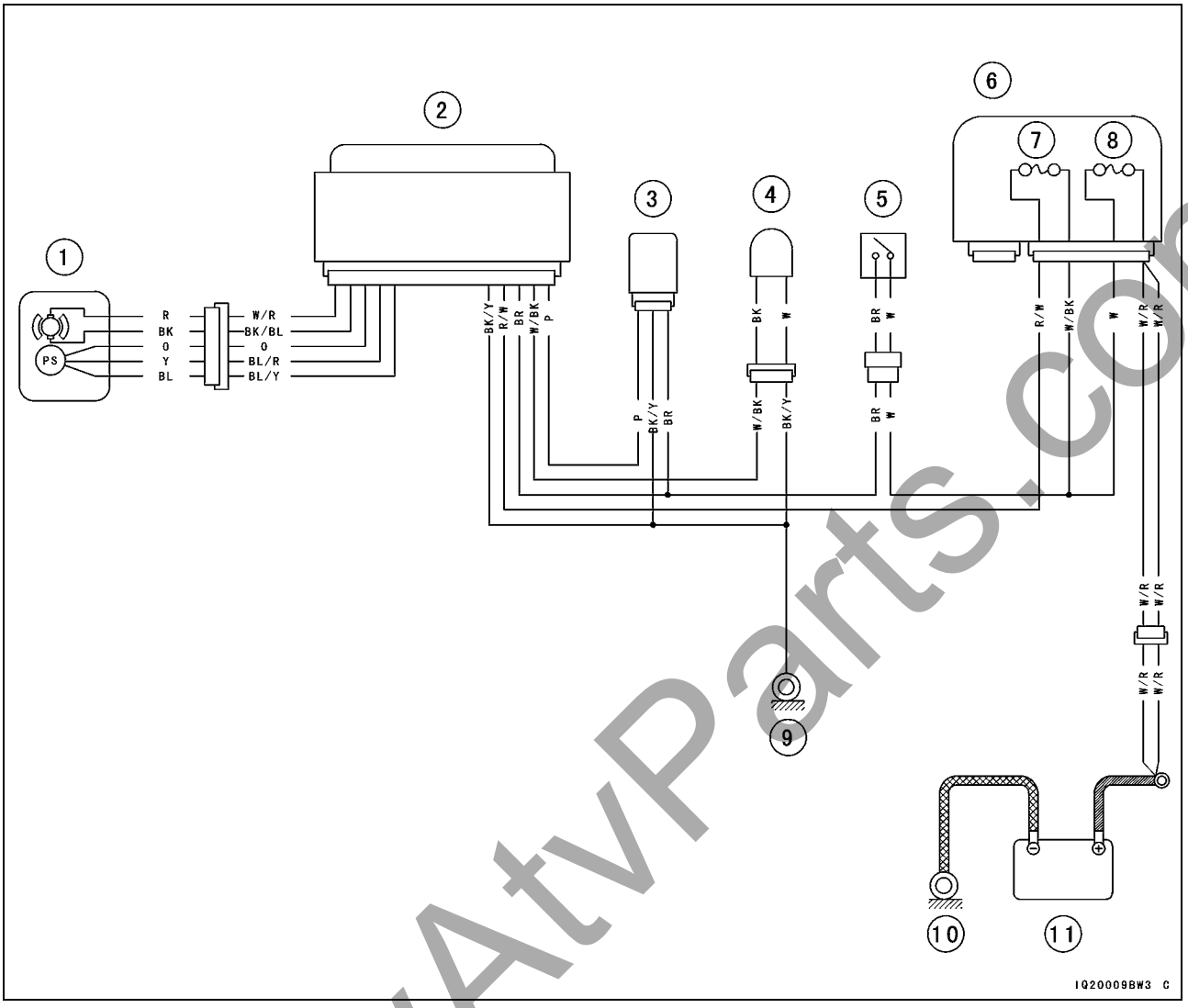
Actuator Control System

Actuator Control System Circuit



1. Engine Brake Actuator
2. Actuator Controller
3. Speed Sensor
4. Forward/Reverse Detecting Sensor
5. Ignition Switch
6. Fuse Box
7. Actuator Controller Fuse 10 A
8. Main Fuse 30 A
9. Frame Ground 1
10. Engine Ground
11. Battery

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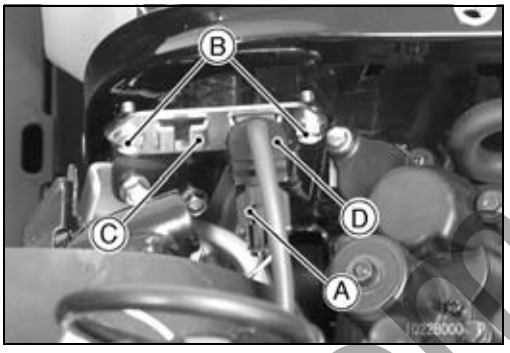
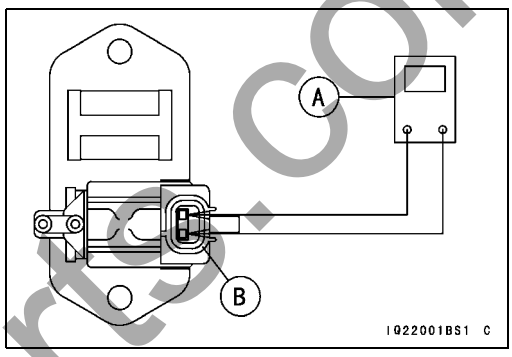
2WD/4WD Solenoid Valve

2WD/4WD Solenoid Valve Inspection



- Remove:
  Right Bracket (see Right Bracket Removal in the Frame chapter)
  2WD/4WD Solenoid Valve Lead Connector [A]
  Bracket Bolts [B]
  Bracket [C] with 2WD/4WD Solenoid Valve [D]
  Hose Ends (from each part)



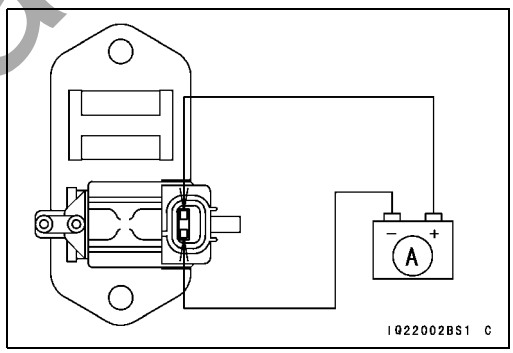
- Set the hand tester [A] to × 10 Ω range and connect the tester leads to the terminals in the 2WD/4WD solenoid valve connector [B].

  Special Tool - Hand Tester: 57001-1394

  2WD/4WD Solenoid Valve Resistance
  Standard: 37 ~ 43 Ω at 20°C (68°F)

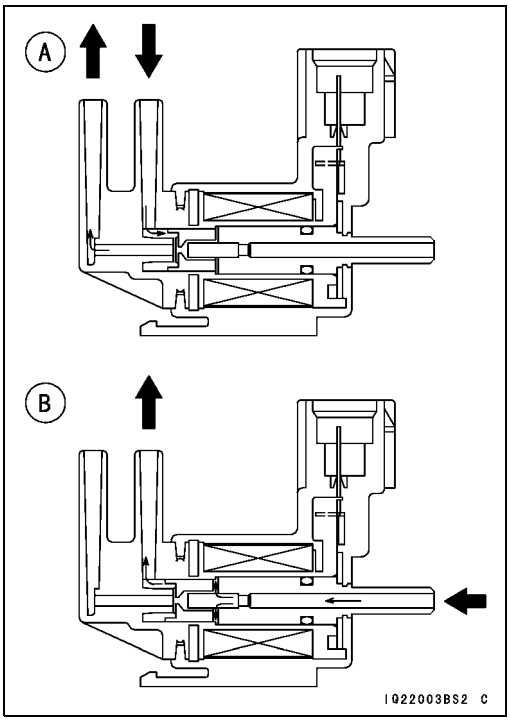
★If the reading is out of the standard, replace the 2WD/4WD solenoid valve.

★If the reading is standard resistance, check the operation of the 2WD/4WD solenoid valve as follows.



- Connect the 12 V battery [A] to the terminals in the 2WD/4WD solenoid valve connector as shown in the figure.
- When the battery is connected, check that the 2WD/4WD solenoid valve makes a clicking sound (operating sound).

★If the 2WD/4WD solenoid valve does not click, replace it.



- When the battery is connected, check that the 2WD/4WD solenoid valve operates the air flow (arrows) as shown in the figure.
  [A] Battery is connected.
  [B] Battery is disconnected.

★If the 2WD/4WD solenoid valve does not work, replace it

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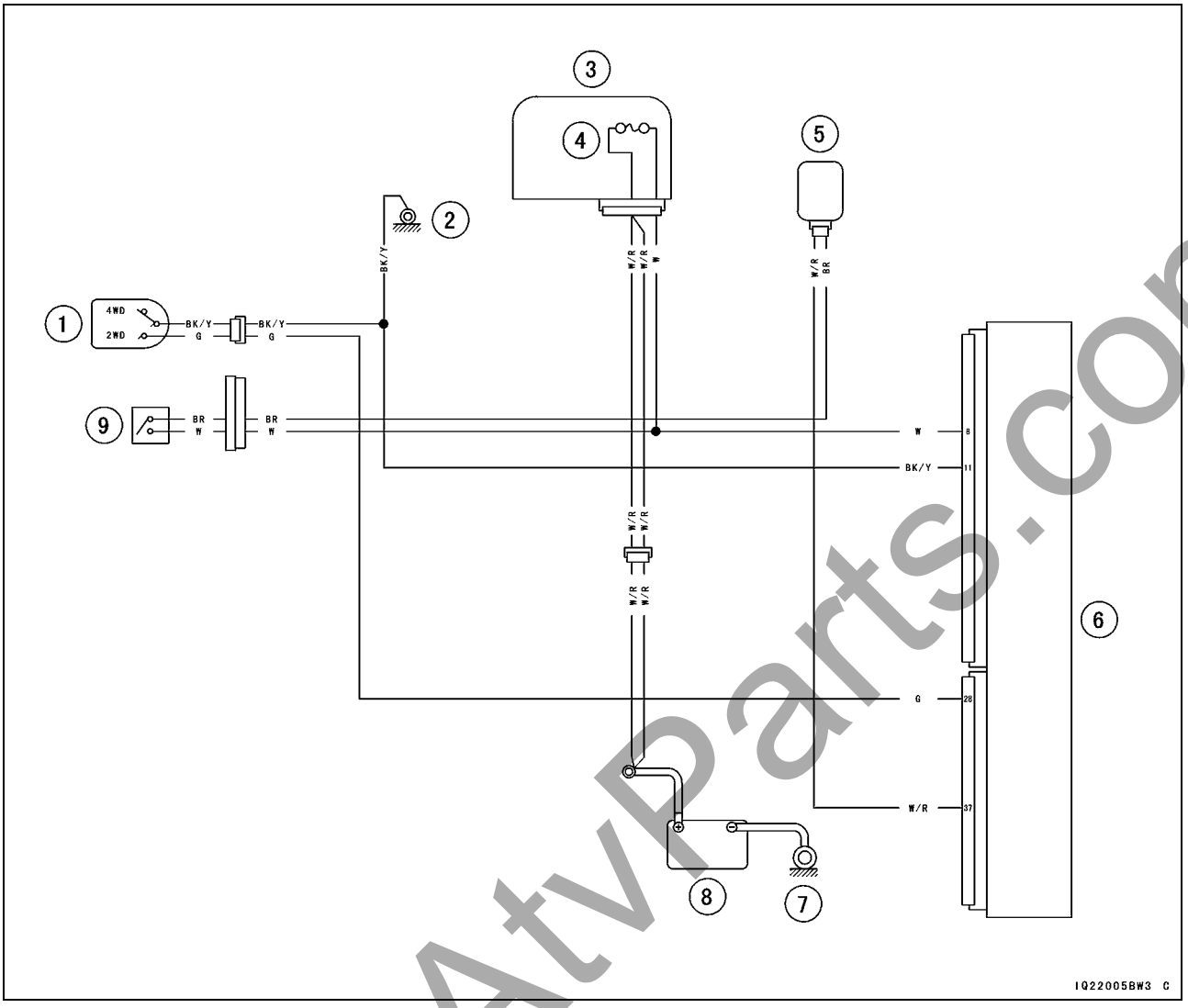
2WD/4WD Solenoid Valve



1. 2WD/4WD Shift Switch
2. Frame Ground 1
3. Fuse Box
4. Main Fuse 30 A
5. 2WD/4WD Solenoid Valve
6. ECU
7. Engine Ground
8. Battery
9. Ignition Switch

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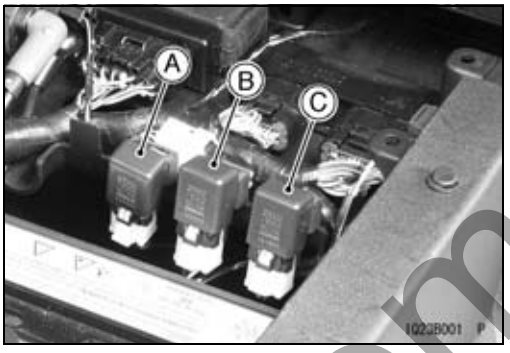
Relay

Relay Inspection



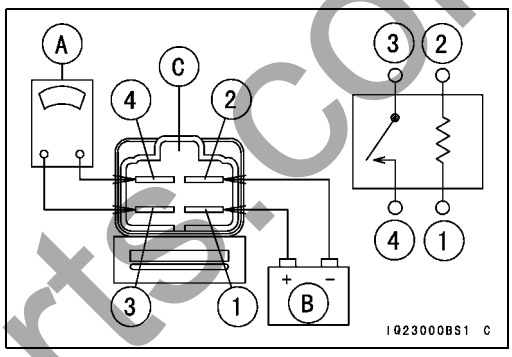
● Remove:
Left Seat (see Seat Removal in the Frame chapter)
Starter Control Relay [A]
Radiator Fan Relay [B]
Fuel Pump Relay [C]

○The relays are identical.

● Connect the hand tester [A] and a 12 V battery [B] to the relay [C] as shown.

Special Tool - Hand Tester: 57001-1394

★If the relay does not work as specified, the relay is defective. Replace the relay.



Testing Relay

Hand Tester Range: × 1 Ω

Criteria: When battery is connected ⇒ 0 Ω

When battery is disconnected ⇒ ∞ Ω

Relay Coil Terminals: [1] and [2]

Relay Switch Terminals: [3] and [4]

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Switches and Sensor

Brake Light Switch Adjustment

- Refer to the Brake Light Switch Inspection and Adjustment in the Periodic Maintenance chapter.

Water Temperature Switch Inspection

- Refer to the Water Temperature Sensor Inspection in the Fuel System (DFI) chapter.

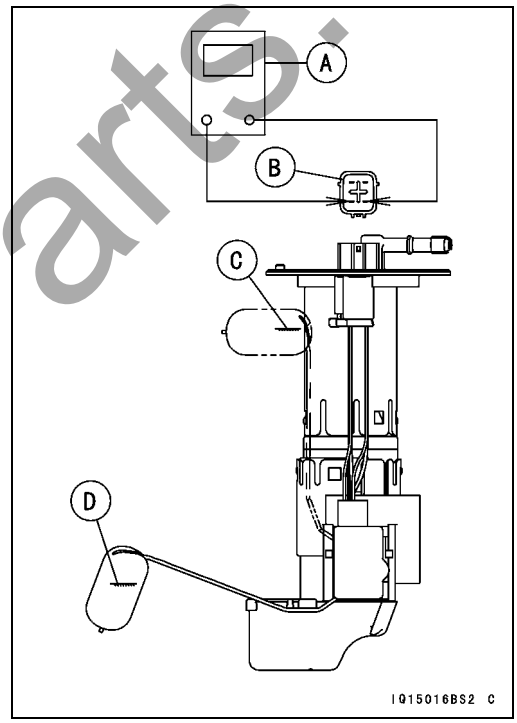
Fuel Level Sensor Inspection

- Remove:
  Fuel Pump (see Fuel Pump Removal in the Fuel System (DFI) chapter)
- Check that the float moves up and down smoothly without binding. It should go down under its own weight.

★If the float does not move smoothly, replace the fuel pump assembly.

- Using a hand tester [A], measure the resistance across the terminals in the fuel pump lead connector [B].

Special Tool - Hand Tester: 57001-1394



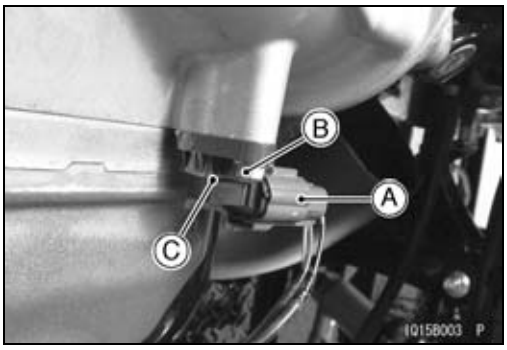
NOTE

○*In contrast to the normal measuring method, the current that flows through the gauge when measuring it with a tester is very low, thus making the measurement easily affected by the oxidized film of the resistance plate, and resulting in excessive resistance. Therefore, make sure to wipe the resistance plate with alcohol before taking a measurement.*

★If the readings are not as specified, replace the fuel pump assembly.

Fuel Level Sensor Resistance
Standard: Full Level Position [C]: 10 Ω
Empty Level Position [D]: 120 Ω

Speed Sensor Removal/Installation



- Drain the engine oil (see Engine Oil Change in the Periodic Maintenance Chapter).
- Disconnect the speed sensor Connector [A].
- Remove:
  Bolt [B]
  Speed Sensor [C]
- Replace the O-ring with a new one.
- Apply grease to the O-ring.
- Install the speed sensor to the fully seated position before tightening the mounting bolt.

NOTE

○*If the sensor is not fully seated before tightening the bolt, the O-ring can be damaged and oil may leak.*

- Tighten:

Torque - Speed Sensor Mounting Bolt: 8.8 N·m (0.90 kgf·m, 78 in·lb)

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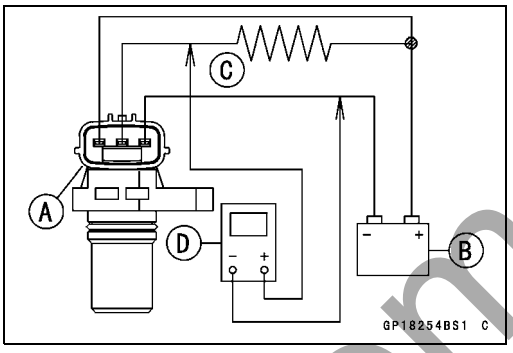
Switches and Sensor

Speed Sensor Inspection

- Remove the speed sensor (see Speed Sensor Removal).
- Connect the speed sensor connector [A] with the battery [B], 10 kΩ resistor [C] and hand tester [D] as shown.
- Set the tester to the DC 25 V range.

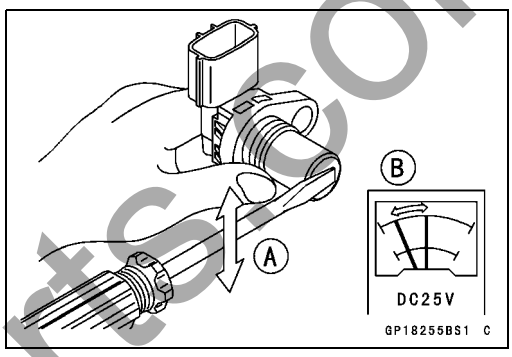
Special Tool - Hand Tester: 57001-1394



- Trace [A] each side of the speed sensor surface with the screw driver.

○Then the tester indicator should flick [B].

★If the tester indicator does not flick, replace the speed sensor.



Switch Inspection

- Using the hand tester, check to see that only the connections shown in the table have continuity.

○For the ignition switch and headlight switch, refer to tables in the Wiring Diagram.

★If the switch has an open or short, repair or replace it with a new one.

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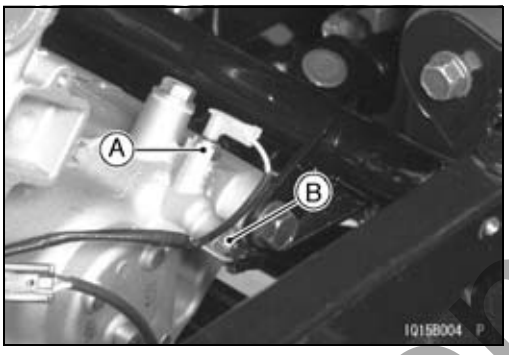
Switches and Sensor

Neutral Position Switch Connection



	SW. Terminal	⏚
When transmission is in neutral	○———	———○
When transmission is not in neutral		

1Q15009BN3 C

[A] Neutral Position Switch

Reverse Position Switch Connection

	SW.Terminal	⏚
When transmission is in reverse	○———	———○
When transmission is not in reverse		

[B] Reverse Position Switch

4WD Position Switch Connection

	SW. Terminal	⏚
2WD Position		
4WD Position	○———	———○

1Q15010BN3 C

2WD/4WD Shift Switch Connection

	G	BK/Y
2WD Position		
4WD Position	○———	———○

1Q15011BN3 C

Brake Light Switch Connection

	BR	BL/W
When brake pedal is pushed down	○———	———○
When brake pedal is released		

1Q15012BN3 C

Parking Brake Position Switch Connection

	G	BK/Y
When parking brake pedal is pushed down	○———	———○
When parking brake pedal is released		

1Q15013BN3 C

Oil Pressure Switch Connection*

	SW. Terminal	⏚
When engine is stopped	○———	———○
When engine is running		

*: Engine lubrication system is in good condition

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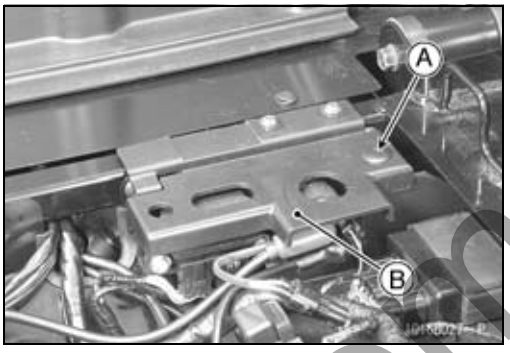
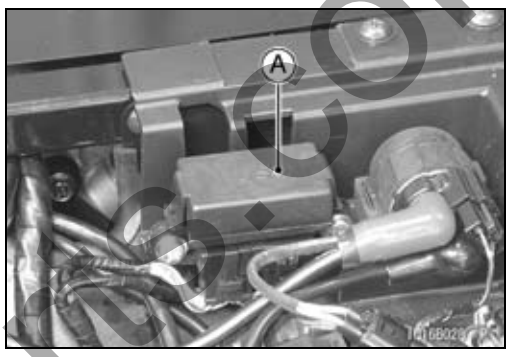
Fuses

Fuse Removal

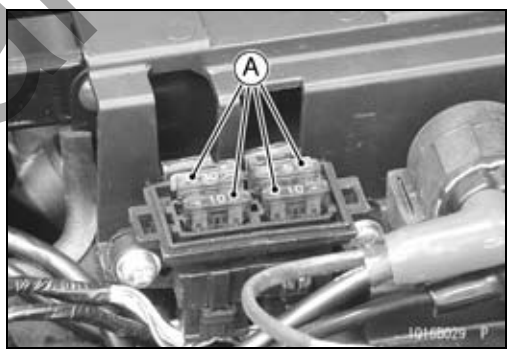
- Remove:
  Left Seat (see Seat Removal in the Frame chapter)
- Push the central pin [A] of the quick rivet and remove it.
- Slide the cover [B] rearward and remove it.



- Remove:
  Fuse Box Lid [A]



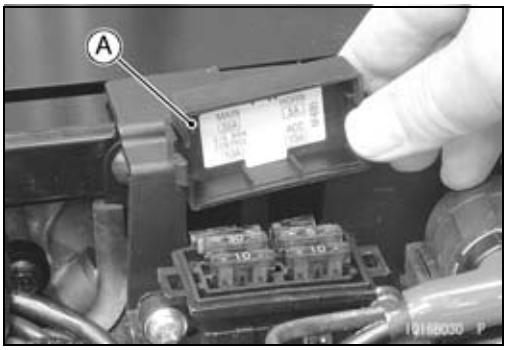
- Pull the fuses [A] straight out of the fuse box with needle nose pliers.



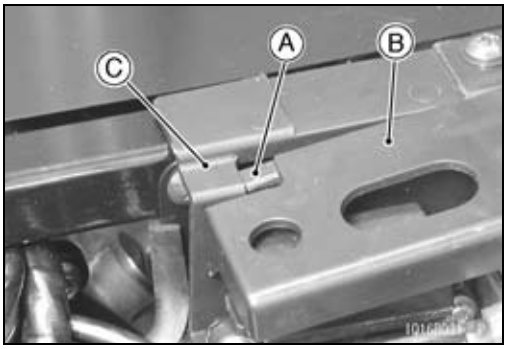
Fuse Installation

★If a fuse fails during operation, inspect the electrical system to determine the cause, and then replace it with a new fuse of proper amperage.

- Install the fuses on the original position as specified on the fuse box lid [A].



- Insert the projection [A] of the cover [B] under the electric parts case [C] and install the cover.



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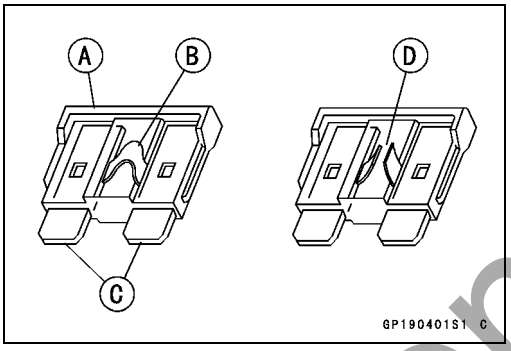
Fuses

Fuse Inspection



● Inspect the fuse element.

★If it is blown out, replace the fuse. Before replacing a blown fuse, always check the amperage in the affected circuit. If the amperage is equal to or greater than the fuse rating, check the wiring and related components for a short circuit.

Housing [A]
Fuse Element [B]
Terminals [C]
Blown Element [D]

NOTICE

When replacing a fuse, be sure the new fuse matches the specified fuse rating for that circuit. Installation of a fuse with a higher rating may cause damage to wiring and components.

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Appendix

Table of Contents

Troubleshooting Guide 17-2
Cable, Wire, and Hose Routing 17-6

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Troubleshooting Guide

NOTE

○*Refer to the Fuel System chapter for most of DFI trouble shooting guide.*

○*This is not an exhaustive list, giving every possible cause for each problem listed. It is meant simply as a rough guide to assist the troubleshooting for some of the more common difficulties.*

Engine Doesn't Start, Starting Difficulty:

Starter motor not rotating:
- Neutral switch trouble
- Starter motor trouble
- Battery voltage low
- Starter and circuit relays not contacting or operating
- Starter button not contacting
- Wiring open or shorted
- Ignition switch trouble
- Fuse blown

Starter motor rotating but engine doesn't turn over:
- Starter motor clutch trouble

Engine won't turn over:
- Valve seizure
- Rocker arm seizure
- Cylinder, piston seizure
- Crankshaft seizure
- Connecting rod small end seizure
- Connecting rod big end seizure
- Transmission gear or bearing seizure
- Camshaft seizure

No fuel flow:
- No fuel in tank
- Fuel tank air vent obstructed
- Fuel line clogged
- Fuel pump damaged or circuit trouble

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air cleaner clogged, poorly sealed, or missing

No spark; spark weak:
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- Crankshaft sensor trouble
- ECU trouble
- Ignition coil trouble
- Battery voltage low
- Ignition switch shorted
- Wiring shorted or open
- Fuse blown

Compression Low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release (KACR) cam sticks open (Engine stalls when moving off)

Poor Running at Low Speed:

Spark weak:
- Spark plug dirty, broken, or maladjusted
- Spark plug cap or spark plug lead trouble
- Spark plug cap shorted or not in good contact
- Spark plug incorrect
- ECU trouble
- Crankshaft sensor trouble
- Ignition coil trouble
- Battery voltage low

Fuel/air mixture incorrect:
- Bypass screw maladjusted
- Air cleaner clogged, poorly sealed, or missing
- Fuel tank air vent obstructed
- Fuel pump trouble
- Throttle body holder loose
- Air cleaner duct loose

Compression low:
- Spark plug loose
- Cylinder head not sufficiently tightened down
- No valve clearance
- Cylinder, piston worn
- Piston ring bad (worn, weak, broken, or sticking)
- Piston ring/groove clearance excessive
- Cylinder head gasket damaged
- Cylinder head warped
- Valve spring broken or weak
- Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface)
- Compression release (KACR) cam sticks open (Engine stalls when moving off)

Other:
- Engine oil viscosity too high
- Brake dragging
- ECU trouble
- Front or rear final gear case oil viscosity too high

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Troubleshooting Guide

Poor Running or No Power at High Speed:
- **Firing incorrect:**
  - Spark plug dirty, broken, or maladjusted
  - Spark plug cap or spark plug lead trouble
  - Spark plug cap shorted or not in good contact
  - Spark plug incorrect
  - Crankshaft sensor trouble
  - ECU trouble
  - Ignition coil trouble
- **Fuel/air mixture incorrect:**
  - Air cleaner clogged, poorly sealed, or missing
  - Water or foreign matter in fuel
  - Throttle body holder loose
  - Air cleaner duct loose
  - Fuel tank air vent obstructed
  - Fuel line clogged
  - Fuel pump trouble
- **Compression low:**
  - Spark plug loose
  - Cylinder head not sufficiently tightened down
  - No valve clearance
  - Cylinder, piston worn
  - Piston rings bad (worn, weak, broken, or sticking)
  - Piston ring/groove clearance excessive
  - Cylinder head gasket damaged
  - Cylinder head warped
  - Valve spring broken or weak
  - Valve not seating properly (valve bent, worn, or carbon accumulation on the seating surface.)
  - Compression release cam (K.A.C.R.) sticks open (Engine stalls when moving off)
- **Knocking:**
  - Carbon built up in combustion chamber
  - Fuel poor quality or incorrect
  - Spark plug incorrect
  - ECU trouble
- **Miscellaneous:**
  - Throttle valve won't fully open
  - Brake dragging
  - Engine overheating
  - Engine oil level too high
  - Engine oil viscosity too high
  - Front or rear final gear case oil viscosity too high

Overheating:
- **Firing incorrect:**
  - Spark plug dirty, broken, or maladjusted
  - Spark plug incorrect
  - ECU trouble
- **Fuel/air mixture incorrect:**
  - Throttle body holder loose
  - Air cleaner poorly sealed, or missing
  - Air cleaner duct loose
  - Air cleaner clogged
  - Fuel pump trouble
- **Compression high:**
  - Carbon built up in combustion chamber
- **Engine load faulty:**
  - Engine oil level too high
  - Engine oil viscosity too high
  - Drive train trouble
  - Brake dragging
- **Lubrication inadequate:**
  - Engine oil level too low
  - Engine oil poor quality or incorrect
- **Front or rear final gear case overheating:**
  - Insufficient oil
  - Bevel gears maladjusted
  - LSD clutches in front final gear case maladjustment
- **Coolant incorrect:**
  - Coolant level too low
  - Coolant deteriorated
  - Wrong coolant mixed ratio
- **Cooling system component incorrect:**
  - Radiator fin damaged
  - Radiator clogged
  - Thermostat trouble
  - Radiator cap trouble
  - ECU trouble
  - Water temperature sensor trouble
  - Fan motor broken
  - Fan blade damaged
  - Water pump not turning
  - Water pump impeller damaged

Over Cooling:
- **Cooling system component incorrect:**
  - ECU trouble
  - Water temperature sensor trouble
  - Thermostat trouble

Converter Operation Faulty:
- **Belt slipping:**
  - Belt dirty, worn, or wetted
  - Drive or driven pulley sheave dirty or worn
  - Drive pulley spring broken or weak
- **Converter engagement speed too low:**
  - Drive pulley spring broken or weak
- **Converter engagement speed too high:**
  - Belt dirty or worn
  - Drive or driven pulley sheave dirty or worn
  - Drive pulley weight doesn't move smoothly
  - Drive pulley movable sheave doesn't move smoothly
  - Drive or driven pulley movable sheave bush worn
  - Drive pulley weight or roller worn
- **Shifting too quickly:**
  - Drive pulley spring weak

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Troubleshooting Guide

Driven pulley spring weak or incorrectly installed (too loose)
Shifting too slowly:
Belt dirty or worn
Drive or driven pulley sheave dirty or worn
Drive pulley weight doesn't move smoothly
Drive pulley movable sheave doesn't move smoothly
Drive pulley spring incorrect installed (too tight)
Driven pulley movable sheave doesn't move smoothly

Gear Shifting Faulty:
Doesn't go into gear:
Shift fork bent or seized
Gear stuck on the shaft
Shift tie-rod maladjusted
Shift tie-rod damaged
Jumps out of gear:
Shifter groove worn
Gear dogs worn
Shift fork worn, bent
Shift arm positioning bolt spring weak or broken
Shift tie-rod maladjusted
Drive shaft, output shaft, and/or gear splines worn
Overshifts:
Shift arm positioning bolt spring weak or broken
Shift tie-rod maladjusted

Abnormal Engine Noise:
Knocking:
ECU trouble
Carbon built up in combustion chamber
Fuel poor quality or incorrect
Spark plug incorrect
Overheating
Piston Slap:
Cylinder/piston clearance excessive
Cylinder, piston worn
Connecting rod bent
Piston pin, piston holes worn
Valve noise:
Valve clearance incorrect
Valve spring broken or weak
Camshaft bearing worn
Rocker arm worn
Other noise:
Connecting rod small end clearance excessive
Connecting rod big end clearance excessive
Piston ring worn, broken, or stuck
Piston seizure, damage
Cylinder head gasket leaking
Exhaust pipe leaking at cylinder head connection
Crankshaft runout excessive
Engine mounts loose
Crankshaft bearing worn
Camshaft chain tensioner trouble
Camshaft chain, sprocket, guides worn
Alternator rotor loose

Abnormal Drive Train Noise:
Converter noise:
Belt worn
Drive or driven pulley sheave worn
Drive or driven pulley movable sheave bush worn
Drive or driven pulley mount loose
Driven pulley shoe worn
Drive pulley weight or roller side washer worn
Drive pulley weight or roller worn
Wear guides worn
Transmission noise:
Bearing worn
Transmission gears worn or chipped
Metal chips jammed in gear teeth
Engine oil insufficient or too thin
Front or rear final gear case noise:
Insufficient lubricant
Incorrect oil (Front final gear case)
Bevel gear bearings worn
Bevel gears worn or chipped
Bevel gears maladjusted
Worn LSD clutch friction plate (Front final gear case)
Damaged side gears or pinions (Front final gear case)

Abnormal Frame Noise:
Shock absorber noise:
Shock absorber damaged
Disc brake noise:
Pad installed incorrectly
Pad surface glazed
Disc warped
Caliper trouble
Rear brake noise:
Foreign matter in hub
Brake not properly adjusted
Other noise:
Bracket, nut bolt, etc. not properly mounted or tightened

Exhaust Smokes Excessively:
White smoke:
Piston oil ring worn
Cylinder worn
Valve oil seal damaged
Valve guide worn
Cylinder head gasket damaged
Engine oil level too high

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Troubleshooting Guide

Black Smoke:
Air cleaner clogged
Brown smoke:
Air cleaner duct loose
Air cleaner poorly sealed or missing

Handling and/or Stability Unsatisfactory
Steering wheel hard to turn:
Tire air pressure too low
Steering shaft damaged
Steering shaft lubrication inadequate
Steering shaft bent
Steering gear assembly damaged
Steering knuckle joint damaged
Tie-rod end damaged
LSD clutch maladjusted (front final gear case)
Noise when turning:
Side gear or pinion damaged (front final gear case)
LSD clutch friction plates damaged (Front final gear case)
Steering wheel shakes or excessively vibrates:
Tire worn
Wheel rim warped
Suspension arm bushing worn
Tie-rod joint worn
Axle shaft bearing worn
Steering wheel mount loose
Steering bolt or nut loose
Steering wheel pulls to one side:
Frame bent
Wheel maladjustment
Suspension arm bent or twisted
Steering shaft bent
Steering gear assembly damaged
Front or rear tire air pressure unbalanced
Shock absorber unbalanced
Shock absorption unsatisfactory:
Too hard:
Tire air pressure too high
Shock absorber damaged
Too soft:
Shock absorber oil leaking
Shock absorber spring weak
Tire air pressure too low
Shock absorber damaged

Brake Doesn't Hold
Front brake:
Air in the brake line
Brake fluid leakage
Brake fluid deteriorated
Primary or secondary cup trouble
Master cylinder scratched inside
Pad overworn or worn unevenly
Oil, grease on pads and disc
Disc worn or warped
Brake overheated
Rear Brake:
Brake not properly adjusted
Plates worn
Brake parts worn or damaged

Kawasaki Engine Brake Control System Malfunction:
Actuators failed
Speed sensor short or open
Forward/Reverse detecting sensor short or open
Actuator controller failed
Controller 10 A fuse blown
Battery disconnected

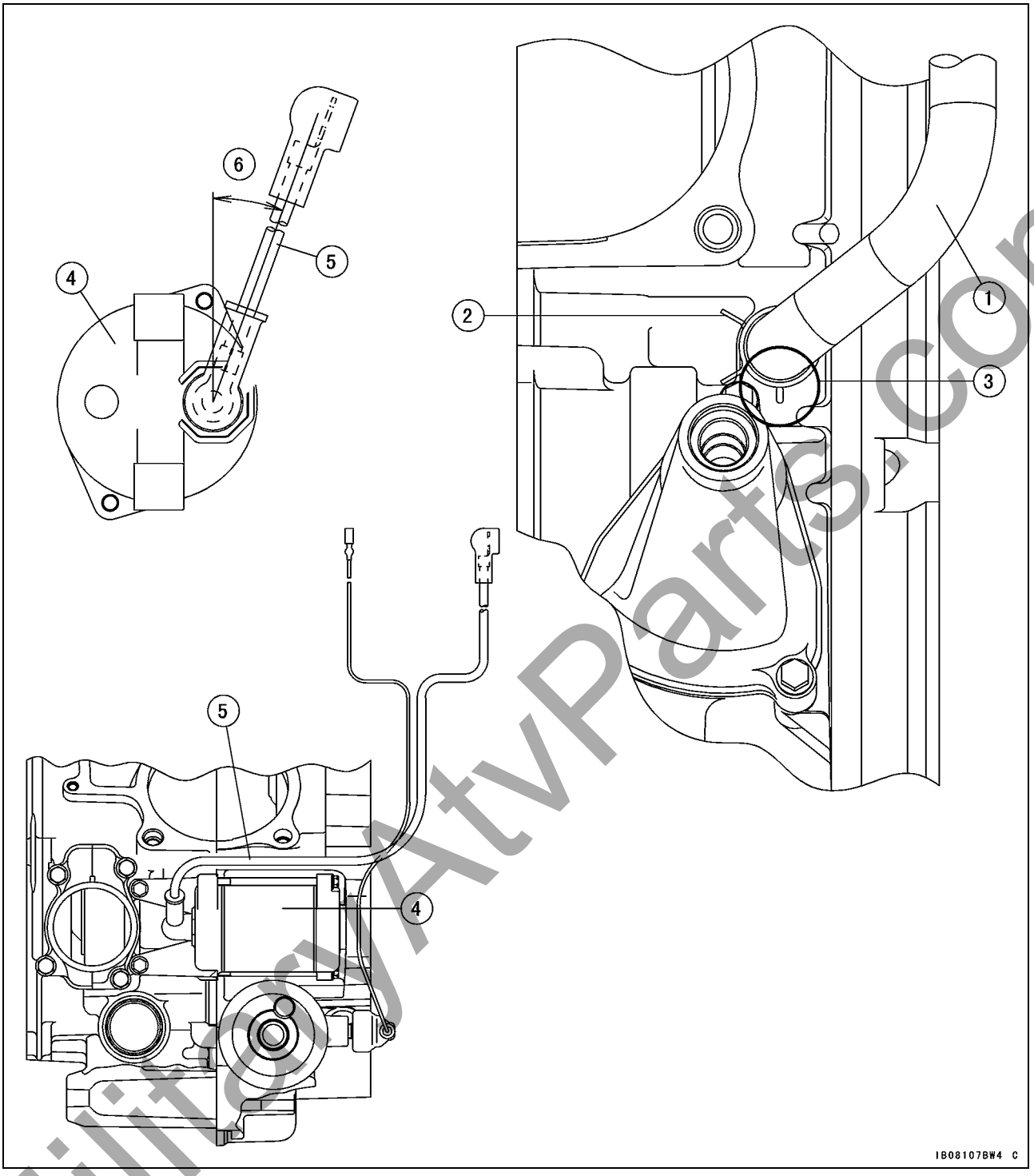
Battery Discharged:
Battery faulty (e.g., plates sulphated, shorted through sedimentation, electrolyte level too low)
Battery leads making poor contact
Load excessive (e.g., bulb of excessive wattage)
Ignition switch trouble
Regulator/rectifier trouble
Alternator trouble
Wiring faulty

Battery Overcharged:
Regulator/rectifier trouble
Battery trouble

MilitaryAtvParts.com

17-6 APPENDIX

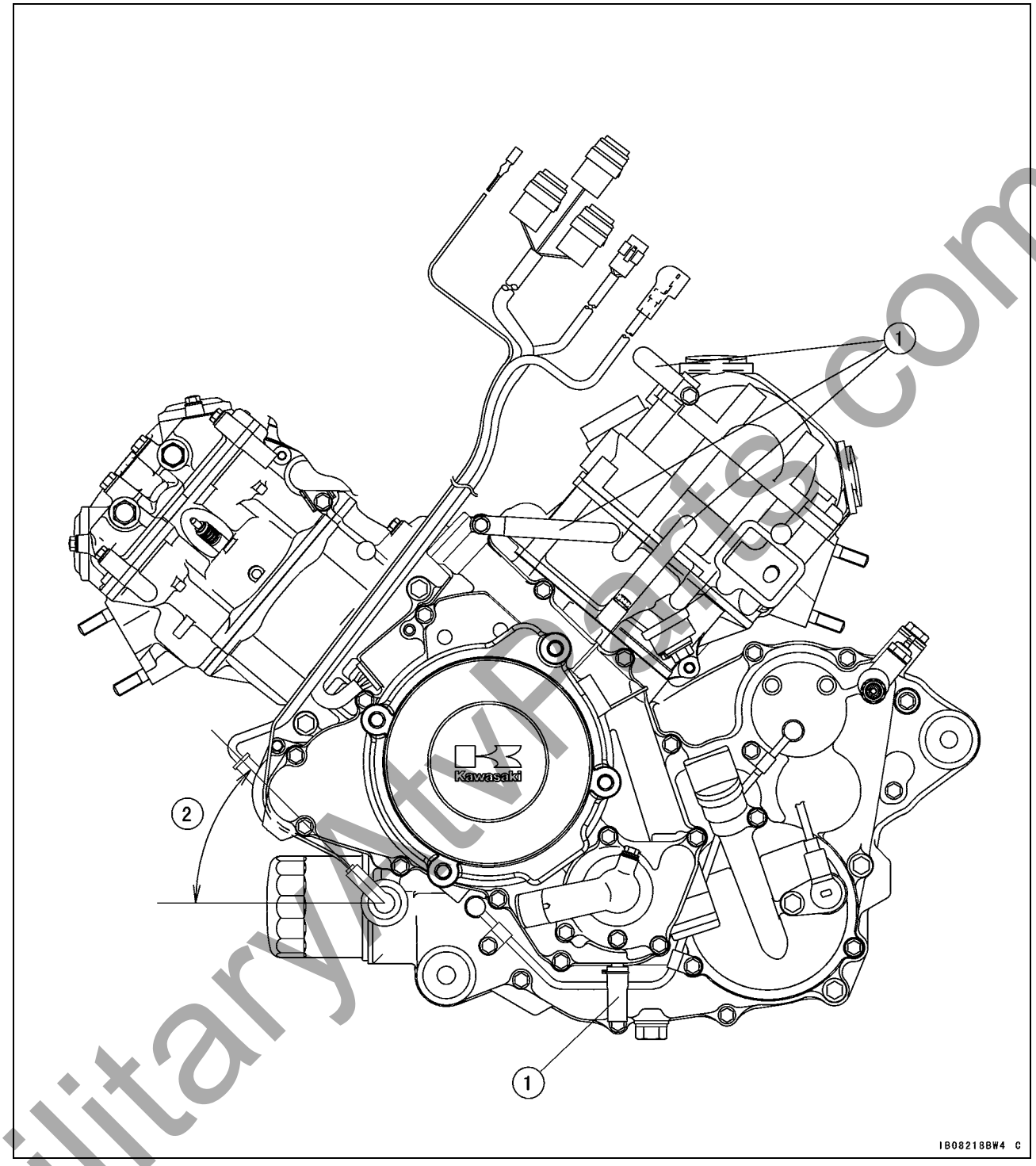
Cable, Wire, and Hose Routing



1. Tube
2. Clamp
3. Align the white paint mark on the tube with the adjustment mark on the crankcase.
4. Starter Motor
5. Starter Motor Cable
6. about 20°

MilitaryAtvParts.com

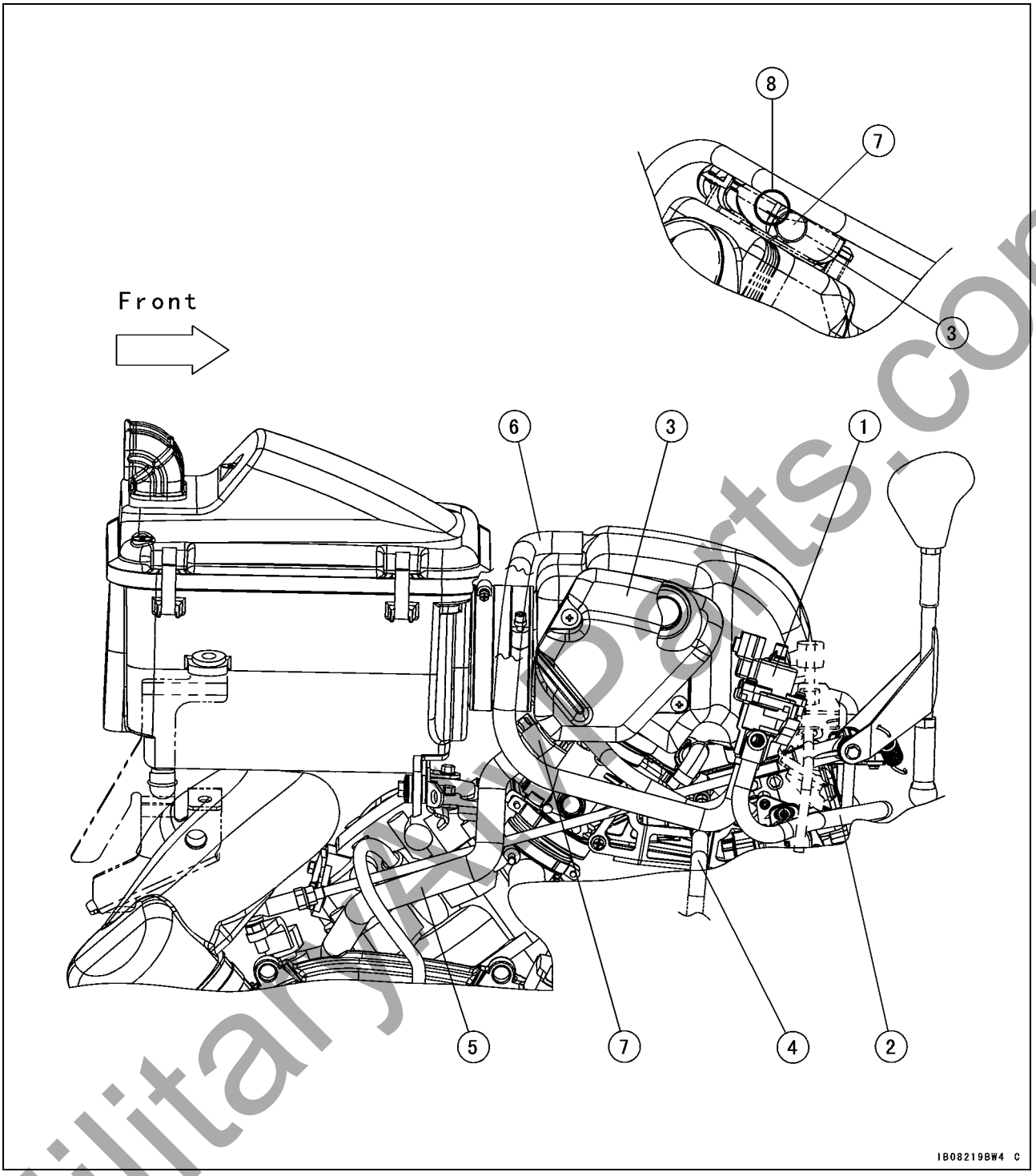
Cable, Wire, and Hose Routing



1. Clamps
2. about 45°

MilitaryAtvParts.com

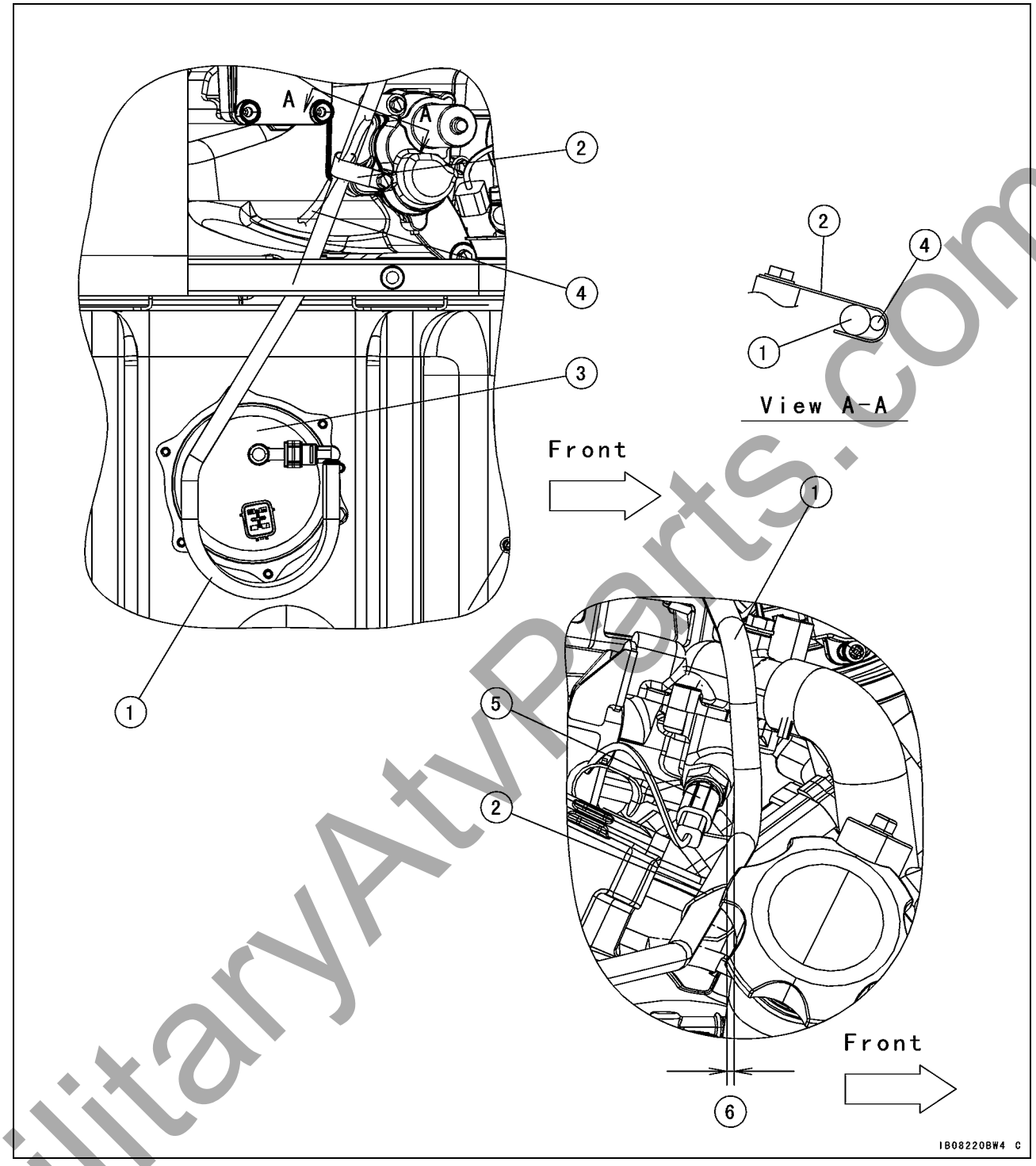
Cable, Wire, and Hose Routing



1. ISC Valve
2. ISC Valve Tube (Front)
3. Resonator
4. Fuel Hose
5. Breather Hose
6. ISC Valve Tube (Rear)
7. Clamp
8. Position the clamp so that its edge must not contact to adjacent tube.

MilitaryATVParts.com

Cable, Wire, and Hose Routing



1. Fuel Hose
2. Clamp (Bend the end of clamp to secure the tube.)
3. Fuel Pump
4. Harness
5. Water Temperature Sensor
6. Keep the clearance between the fuel tube and the water temperature sensor at least 5 mm (0.2 in.).

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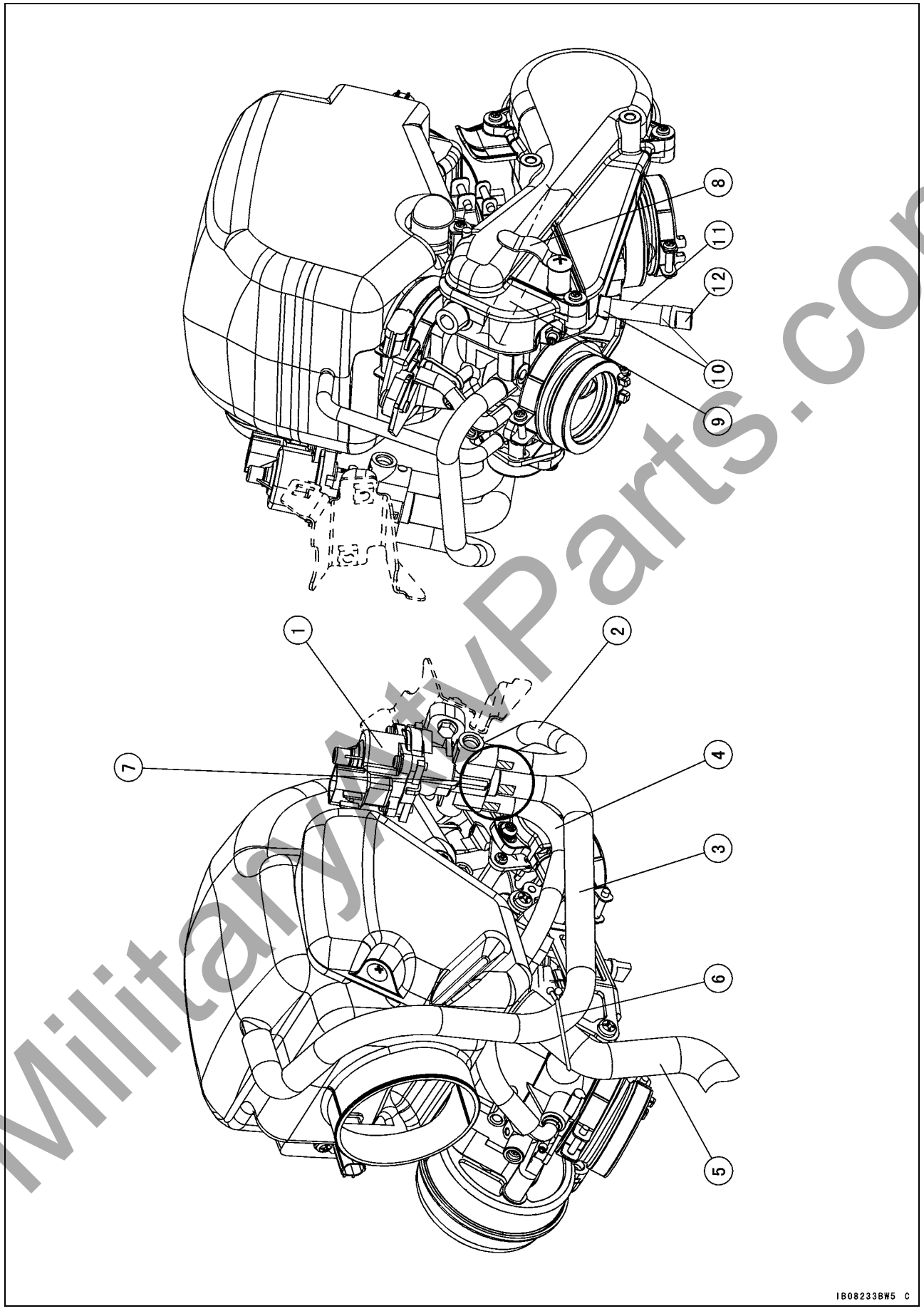
Cable, Wire, and Hose Routing



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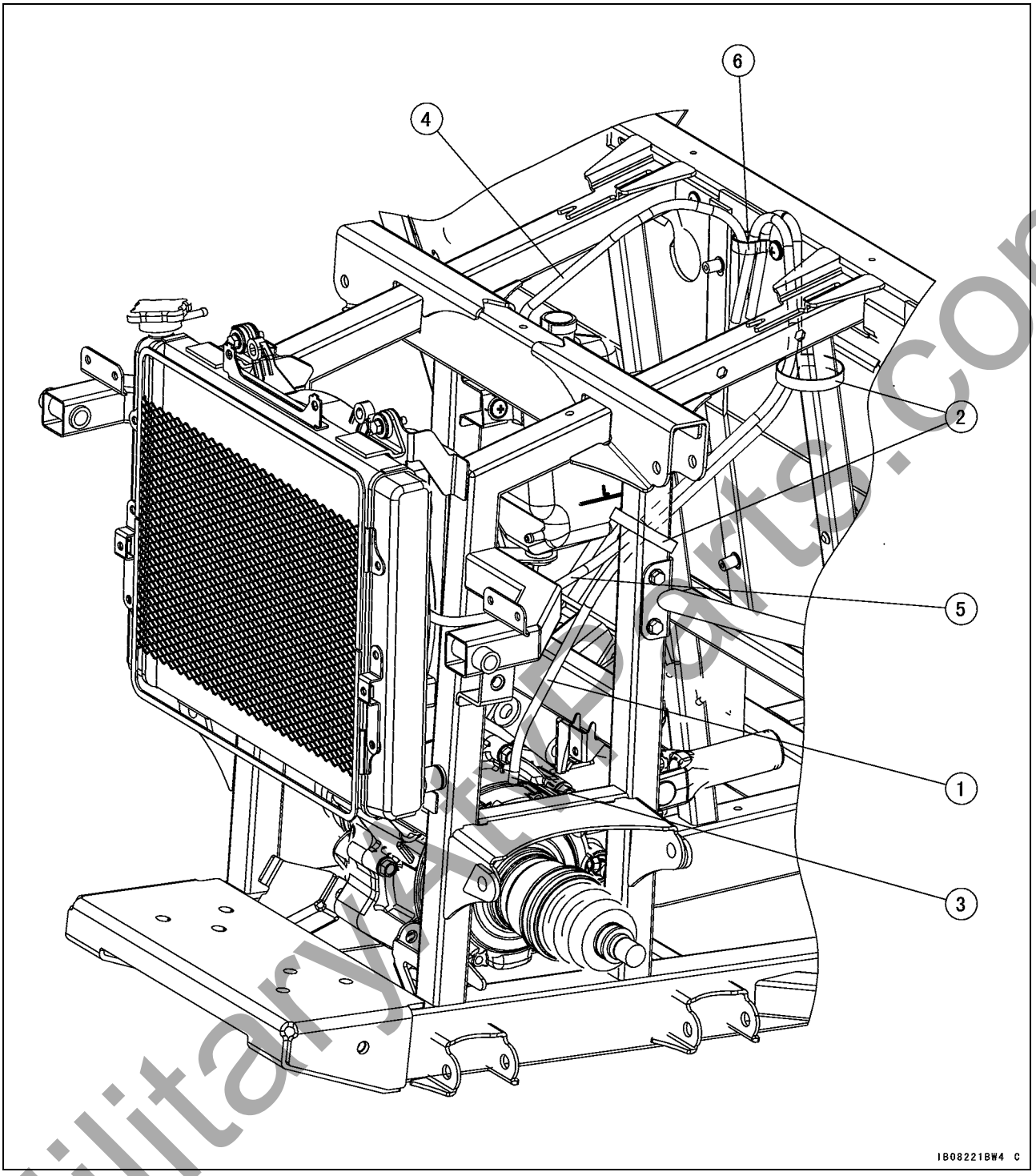
Cable, Wire, and Hose Routing

1. ISC Valve
2. ISC Valve Tube (Front)
3. ISC Valve Tube (Primary)
4. ISC Valve Tube (Rear)
5. Breather Hose
6. Clamp (Clamp the ISC valve tube (Primary) and breather hose.)
7. White Marks
8. Clamp
9. Main Harness
10. Clamps
11. Drain Tube
12. Drain Plug

MilitaryAtvParts.com

Cable, Wire, and Hose Routing



1. Front Gear Case Breather Hose
2. Bands
3. Clamp
4. Reserve Tank Overflow Hose
5. Fan Motor Breather Hose
6. Frame Clamp

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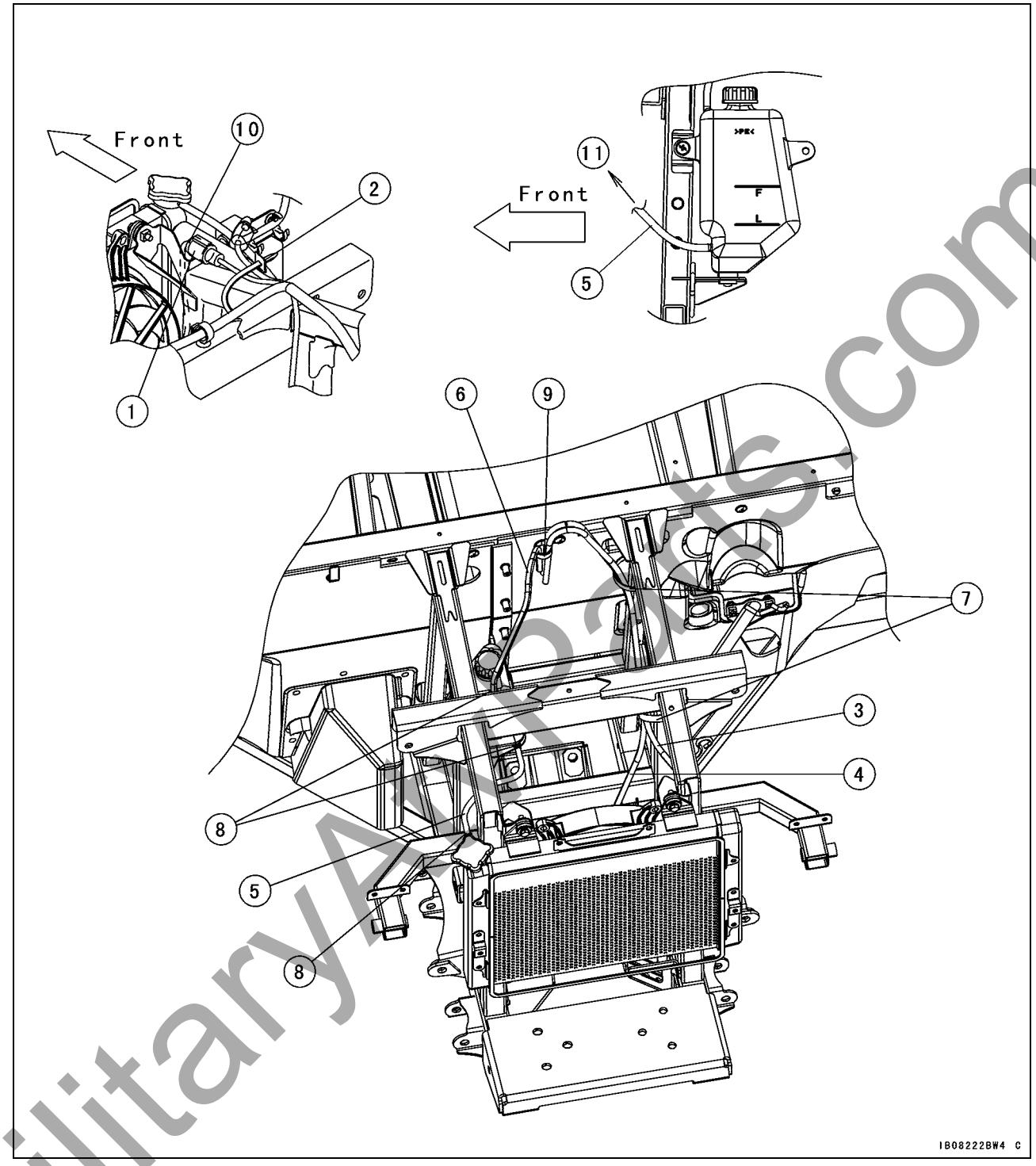
Cable, Wire, and Hose Routing

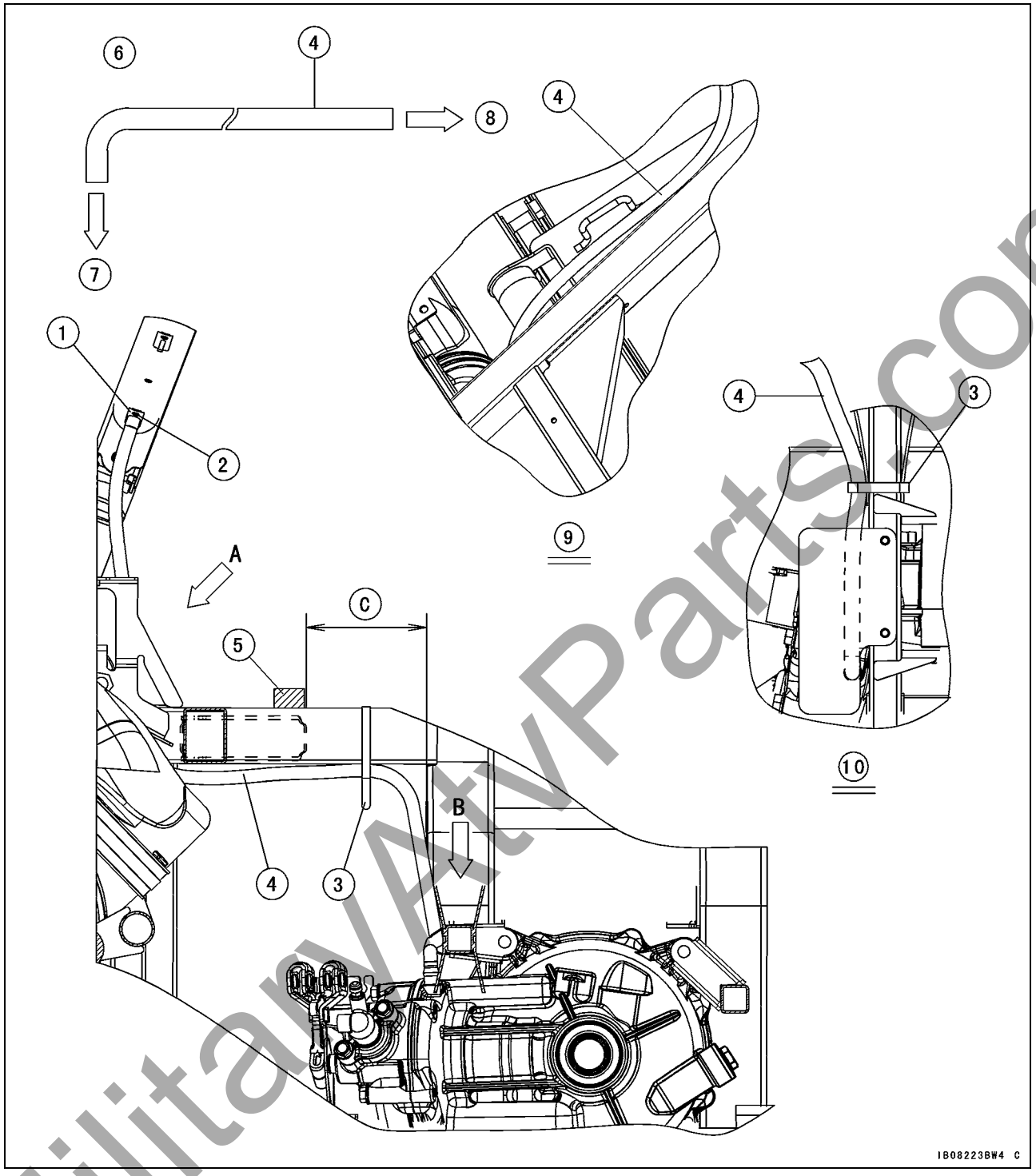


1. Fan Motor Lead Connector
2. Band
3. Fan Motor Breather Hose
4. Front Gear Case Breather Hose
5. Reserve Tank Hose
6. Reserve Tank Overflow Hose
7. Bands
8. Clamps
9. Frame Clamp
10. Run the radiator fan motor lead between the bracket and the radiator hose.
11. to Radiator

MilitaryAutoParts.com

* * * MILITARY USE ONLY * * *

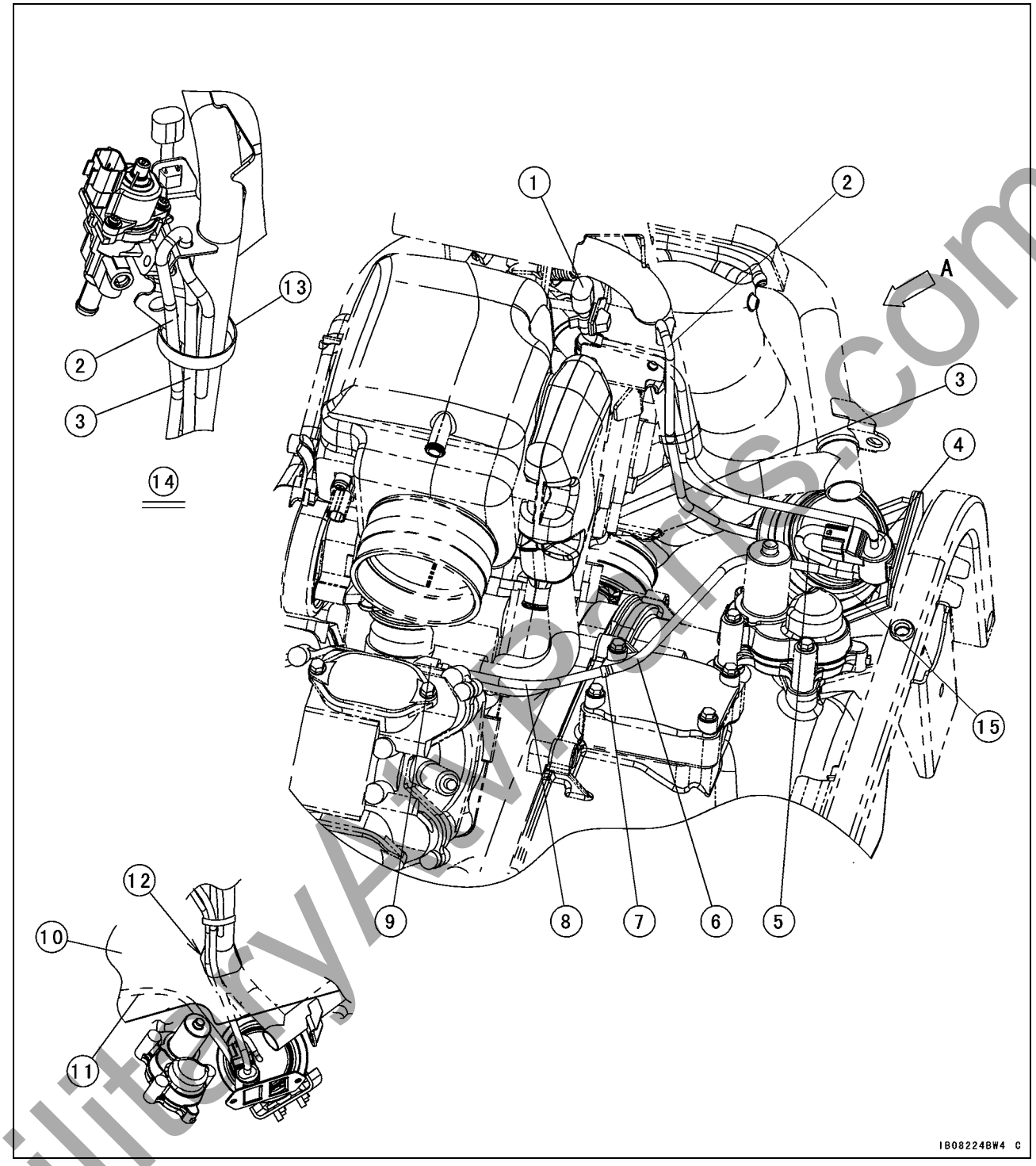
Cable, Wire, and Hose Routing



1. Clamp
2. Insert the breather hose to outside (lower) fitting.
3. Band (Install the band so that the position is about middle in the area [C] and it must avoid the damper of the cargo bed.)
4. Rear Gear Case Breather Hose
5. Damper of Cargo Bed
6. Direction of Breather Hose Installation
7. to Gear Case
8. to Frame
9. View A
10. View B

MilitaryAtvParts.com

Cable, Wire, and Hose Routing



1. Filter
2. Breather Hose
3. Vent Hose
4. 2WD/4WD Solenoid Valve
5. Vacuum Hose
6. Vacuum Hose
7. Clamp
8. Vacuum Hose
9. Clamp
10. Cover
11. Run the vacuum hose under the cover.
12. Run the hoses into the hole.
13. Band
14. View A
15. Vacuum Actuator

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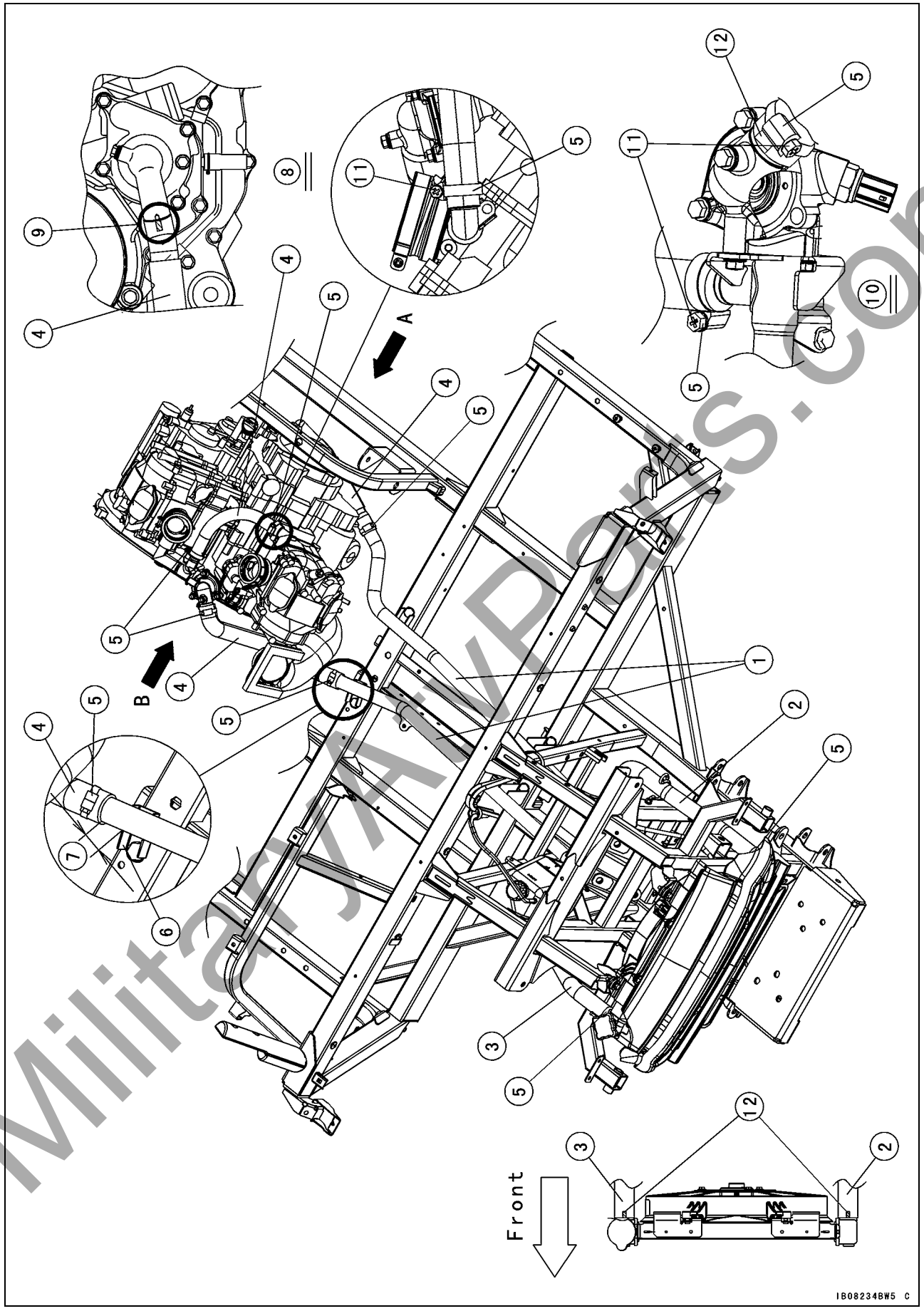
17-16 APPENDIX

Cable, Wire, and Hose Routing



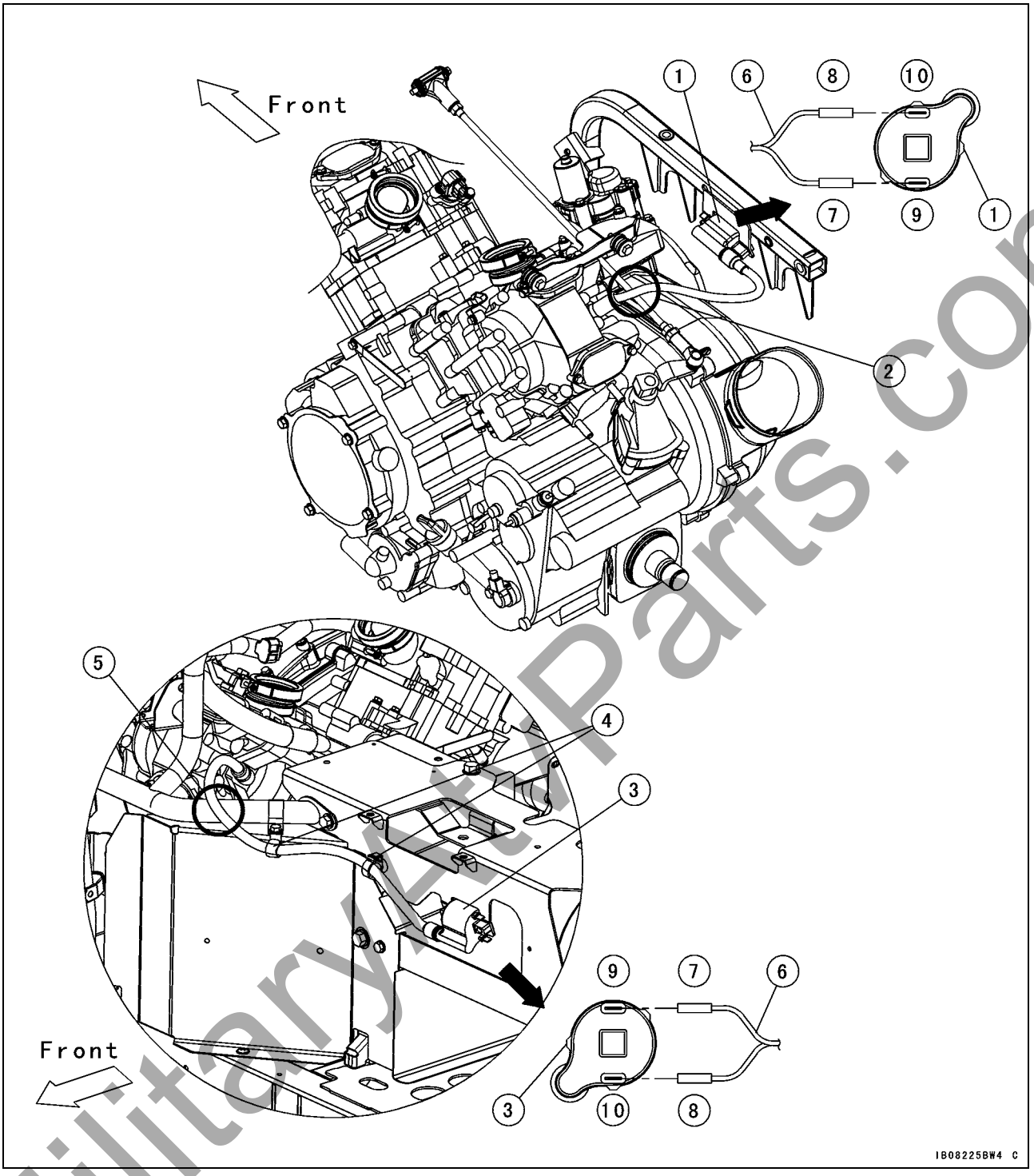
MilitaryAirParts.com

Cable, Wire, and Hose Routing

1. Water Pipes
2. Lower Radiator Hose
3. Upper Radiator Hose
4. Cooling Hose
5. Clamps
6. Bracket
7. Keep clearance of 20 mm (0.8 in.) between the cooling hose and the edge of bracket.
8. View A
9. Align the white paint mark on the cooling hose with the index mark on the pump cover.
10. View B
11. Tighten the clamp screw to the direction as shown in the figure.
12. Connect the cooling hoses with its white mark facing up.

MilitaryAtvParts.com

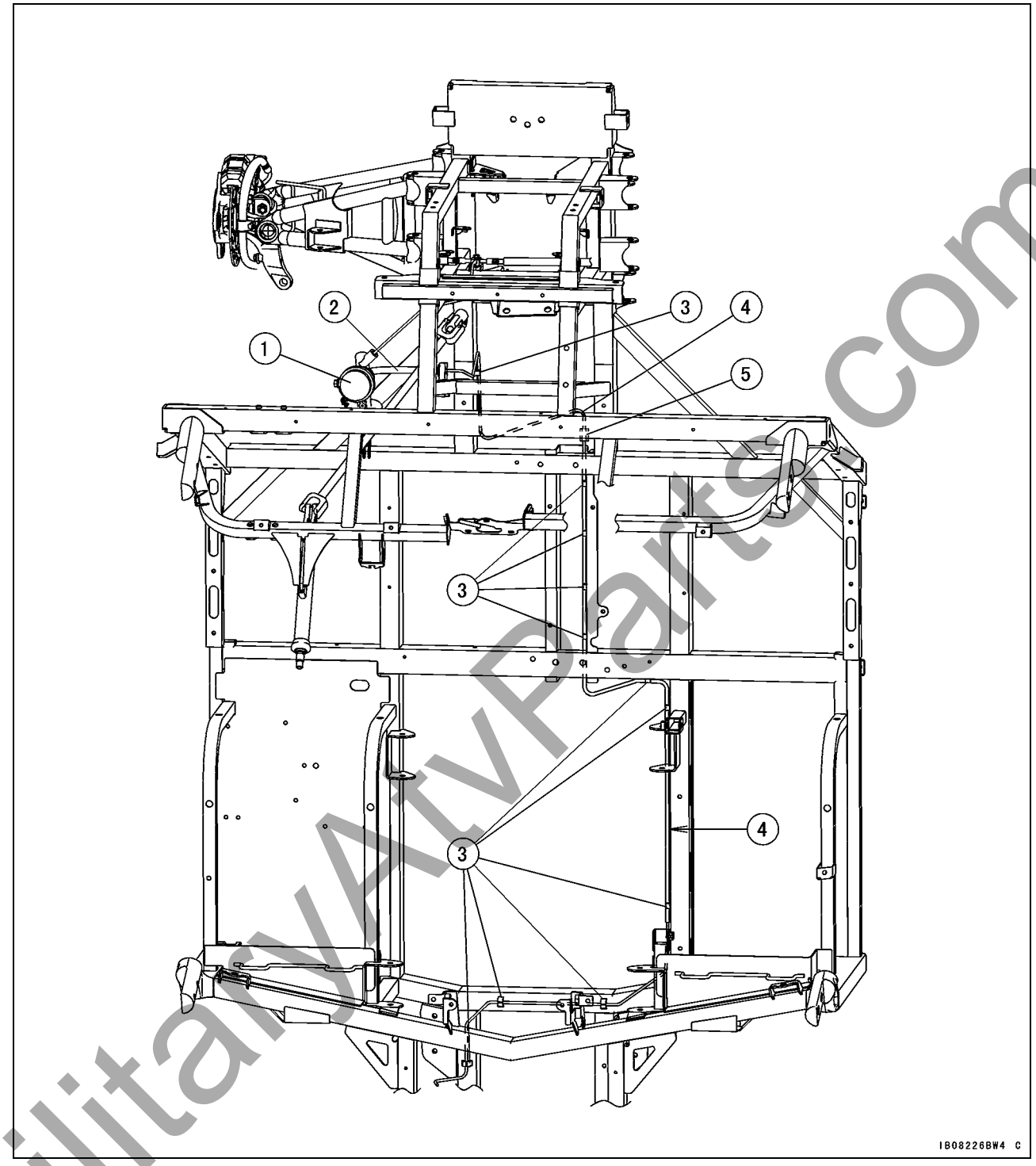
Cable, Wire, and Hose Routing



1. Rear Ignition Coil
2. Run the rear ignition coil lead over the shift lever tie-rod.
3. Front Ignition Coil
4. Clamps
5. Run the front ignition coil lead over the center bracket pipe.
6. Harness
7. Black Connector
8. White Connector
9. Black Terminal
10. Green Terminal

MilitaryATVParts.com

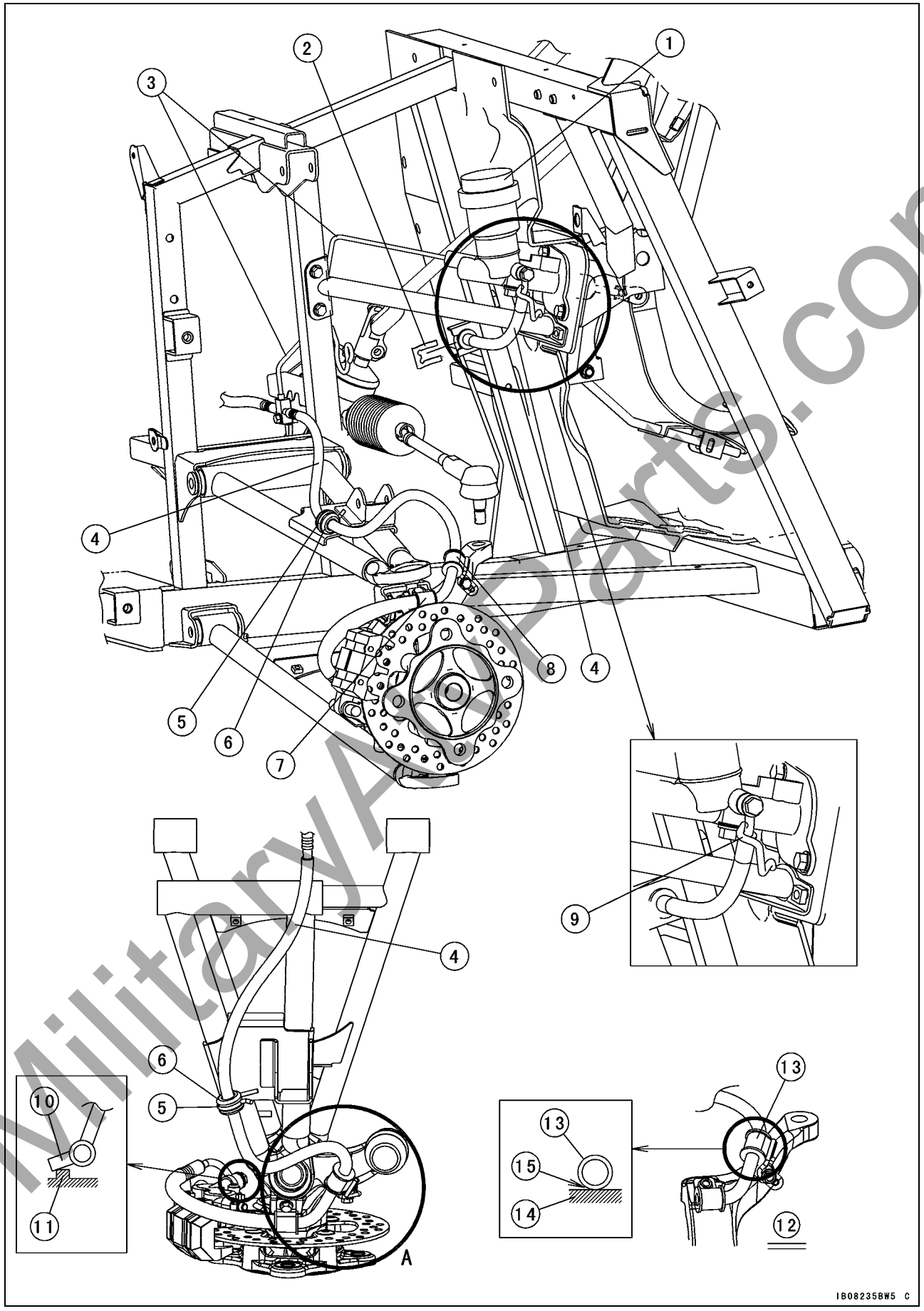
Cable, Wire, and Hose Routing



1. Front Master Cylinder
2. Brake Hose
3. Clamps
4. Brake Pipes
5. Brake Pipe Joint

MilitaryAtvParts.com

Cable, Wire, and Hose Routing



Military AcParts.com

Cable, Wire, and Hose Routing

1. Front Brake Master Cylinder
2. Retainer
3. Brake Pipe
4. Brake Hoses
5. Clamp
6. Grommet
7. Clamp
8. Clamp (Right clamp has red paint. Left clamp is no paint.)
9. Stopper (Hold the brake hose with the stopper.)
10. Brake Hose Stopper (Touch the stopper of the brake hose to the stopper on the caliper.)
11. Caliper Stopper
12. Detail A
13. Clamp (Push the clamp to make the no gap between brake hose and steering knuckle.)
14. Steering Knuckle
15. No gap

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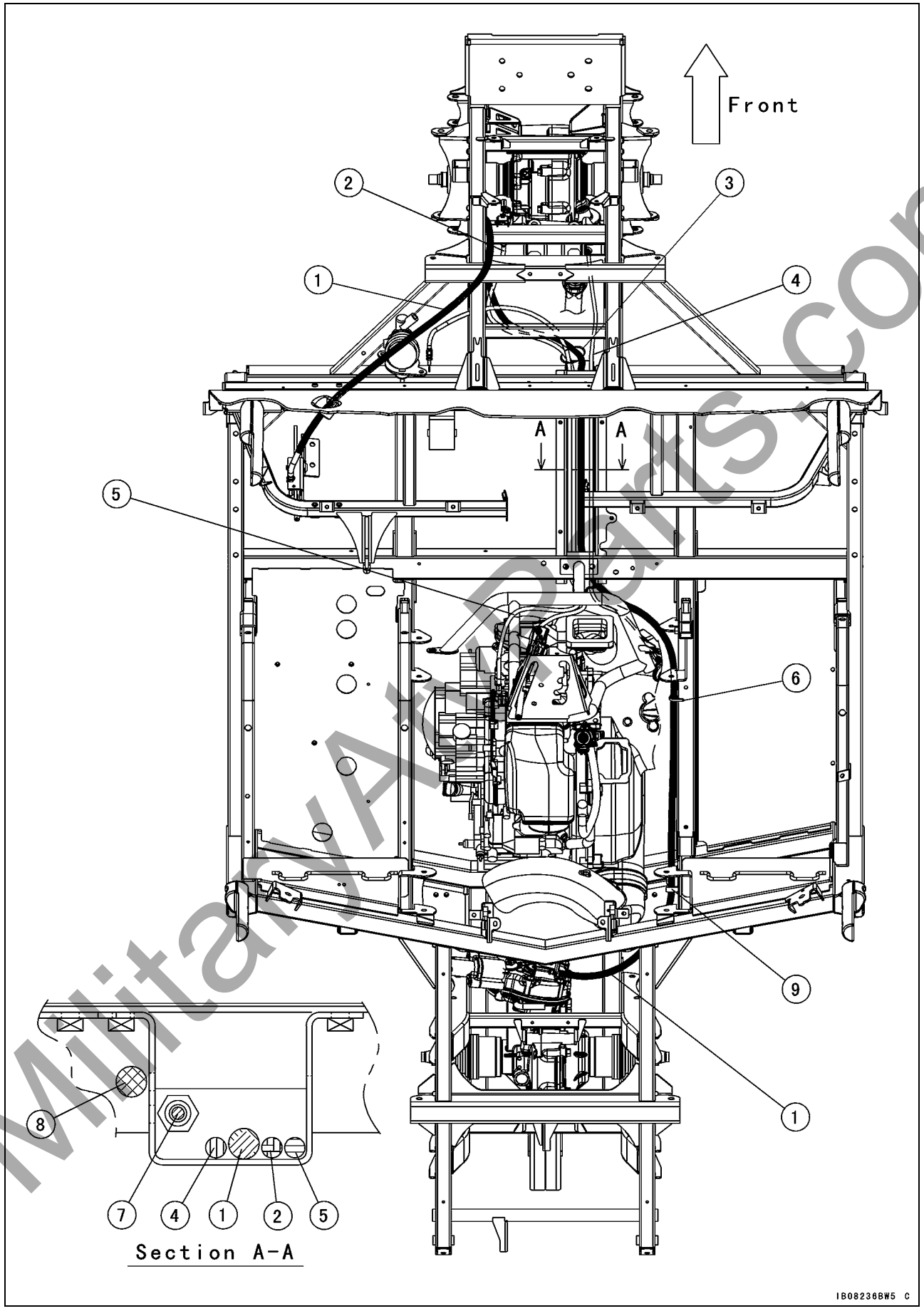
Cable, Wire, and Hose Routing



MilitaryAMParts.com

Cable, Wire, and Hose Routing

1. Parking Brake Cable
2. Differential Shift Cable
3. Band (Secure the differential shift cable and the throttle cable.)
4. 2WD/4WD Shift Cable
5. Throttle Cable
6. Clamp
7. Brake Pipe
8. Main Harness
9. Clamp (Clamp the parking brake cable at the white mark.)

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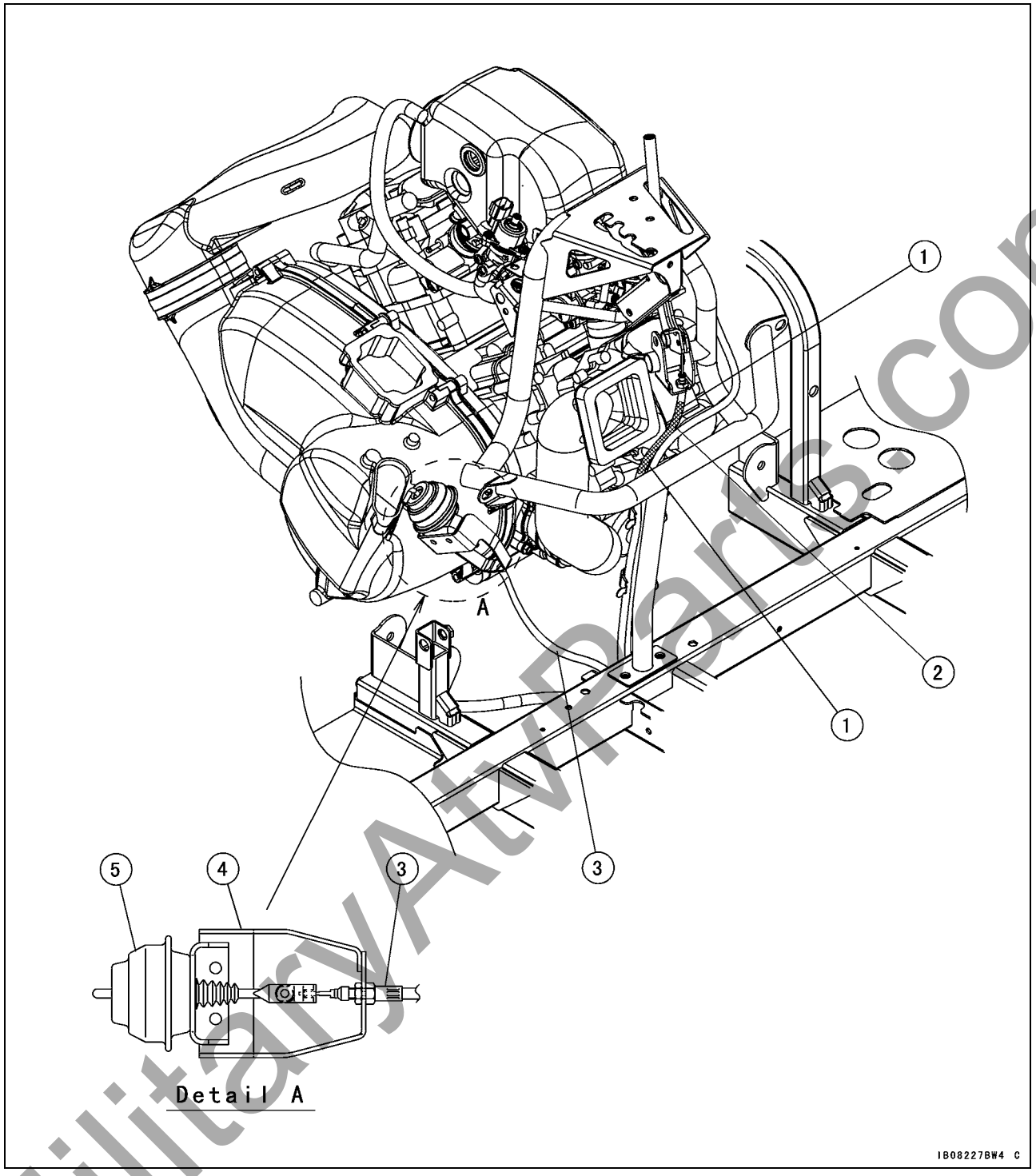
Cable, Wire, and Hose Routing



1. Taping
2. Differential Shift Cable
3. 2WD/4WD Shift Cable
4. Holder
5. Vacuum Actuator

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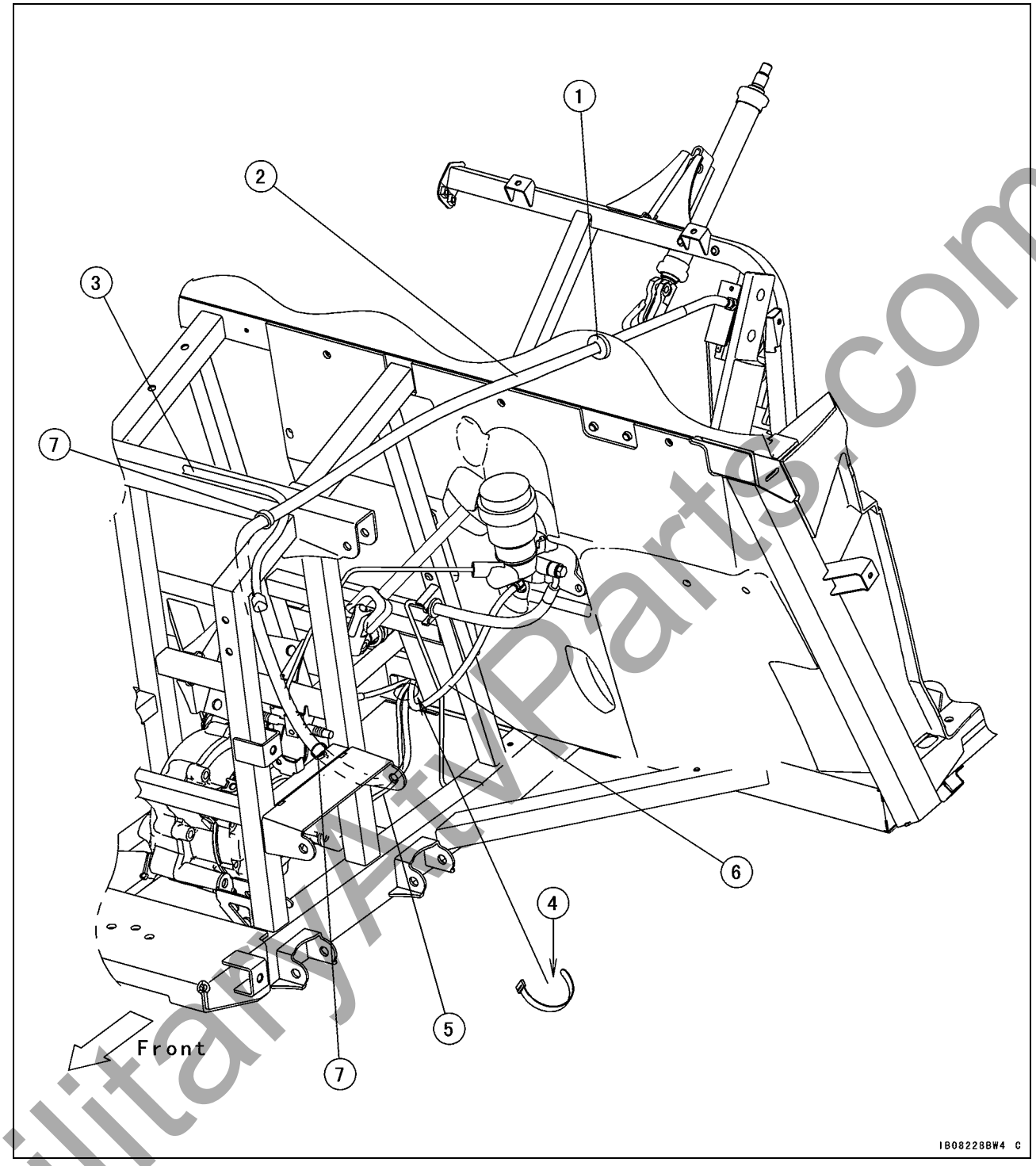
* * * MILITARY USE ONLY * * *

Cable, Wire, and Hose Routing



1. Grommet
2. Parking Brake Cable
3. Main Harness
4. Bands (Secure the differential shift cable and the throttle cable.)
5. Differerntial Shift Cable
6. Throttle Cable
7. Clamp

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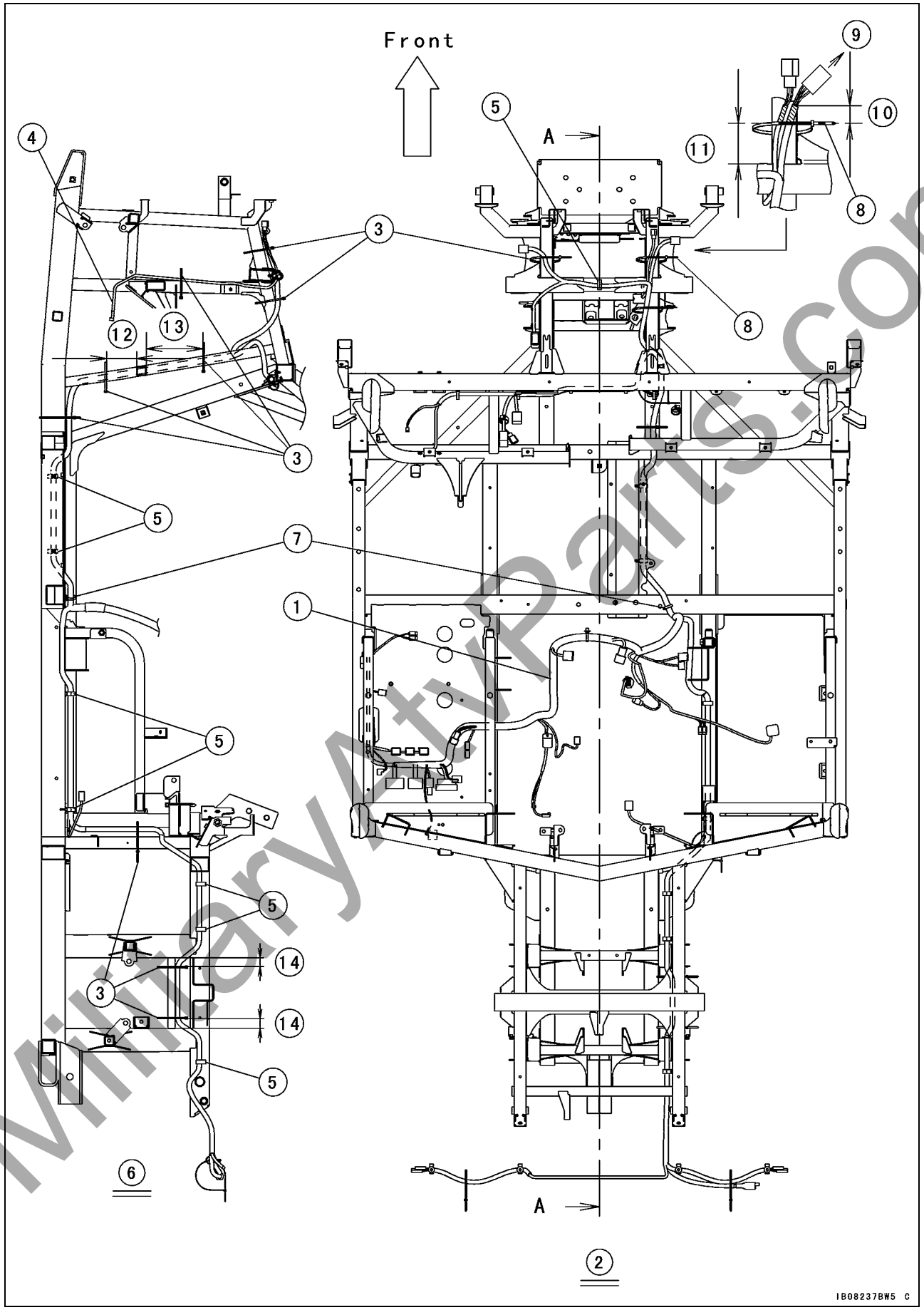
Cable, Wire, and Hose Routing



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Cable, Wire, and Hose Routing

1. Main Harness
2. Top View
3. Bands
4. to 2WD/4WD Shift Switch (Apply grease to the terminals.)
5. Clamps
6. Side View (Section A-A)
7. Push the pre-installed clamp into the hole of frame.
8. Band (Clamp the wire harnesses at the taped areas.)
9. to Radiator Fan Motor
10. 20 ~ 40 mm (0.8 ~ 1.6 in.), Right and Left side
11. 40 ~ 60 mm (1.6 ~ 2.4 in.), Right and Left side
12. 70 ~ 90 mm (2.8 ~ 3.5 in.)
13. 140 ~ 160 mm (5.5 ~ 6.3 in.)
14. 30 mm (1.2 in.) maximum

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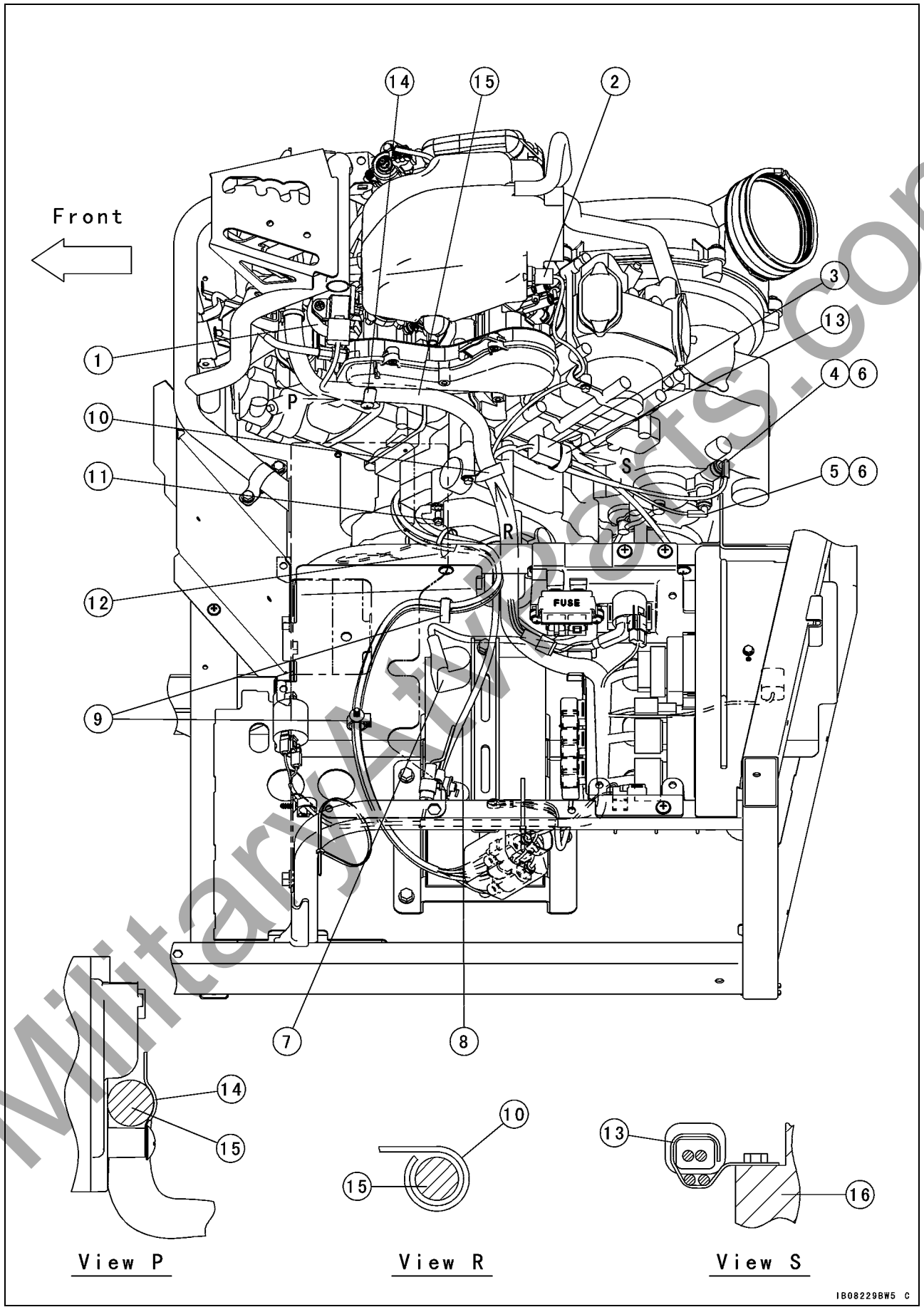
17-28 APPENDIX

Cable, Wire, and Hose Routing

US model



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Cable, Wire, and Hose Routing

1. Inlet Air Pressure Sensor
2. Inlet Air Temperature Sensor
3. Forward/Reverse Detecting Sensor Connector
4. Neutral Position Switch
5. Reverse Position Switch
6. Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the connectors.
7. Battery Positive (+) Cable
8. Battery Negative (–) Cable
9. Clamp the alternator lead, crankshaft sensor lead and oil pressure sensor lead with clamps.
10. Clamp the main harness with clamp as shown.
11. Engine Ground
12. Clamp the alternator lead, crankshaft sensor lead, oil pressure sensor lead, battery negative (–) cable and starter cable with band.
13. Clamp the connector so that the connector does not touch to the engine.
14. Clamp
15. Main Harness
16. Engine

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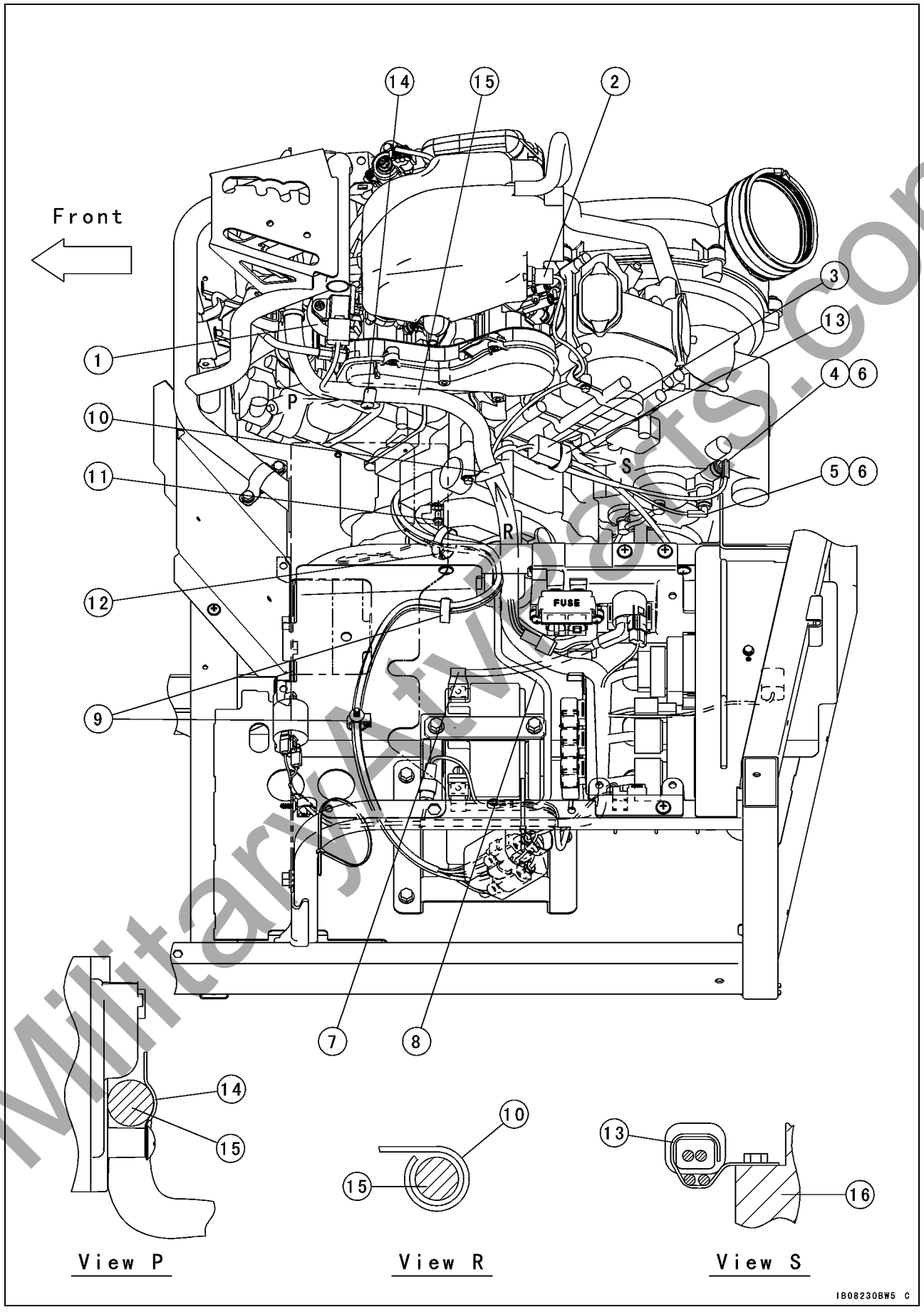
Cable, Wire, and Hose Routing

CA model



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Cable, Wire, and Hose Routing

1. Inlet Air Pressure Sensor
2. Inlet Air Temperature Sensor
3. Forward/Reverse Detecting Sensor Connector
4. Neutral Position Switch
5. Reverse Position Switch
6. Apply grease (Chevron Black Pearl Grease EP NLGI 2) to the connectors.
7. Battery Positive (+) Cable
8. Battery Negative (–) Cable
9. Clamp the alternator lead, crankshaft sensor lead and oil pressure sensor lead with clamps.
10. Clamp the main harness with clamp as shown.
11. Engine Ground
12. Clamp the alternator lead, crankshaft sensor lead, oil pressure sensor lead, battery negative (–) cable and starter cable with band.
13. Clamp the connector so that the connector does not touch to the engine.
14. Clamp
15. Main harness
16. Engine

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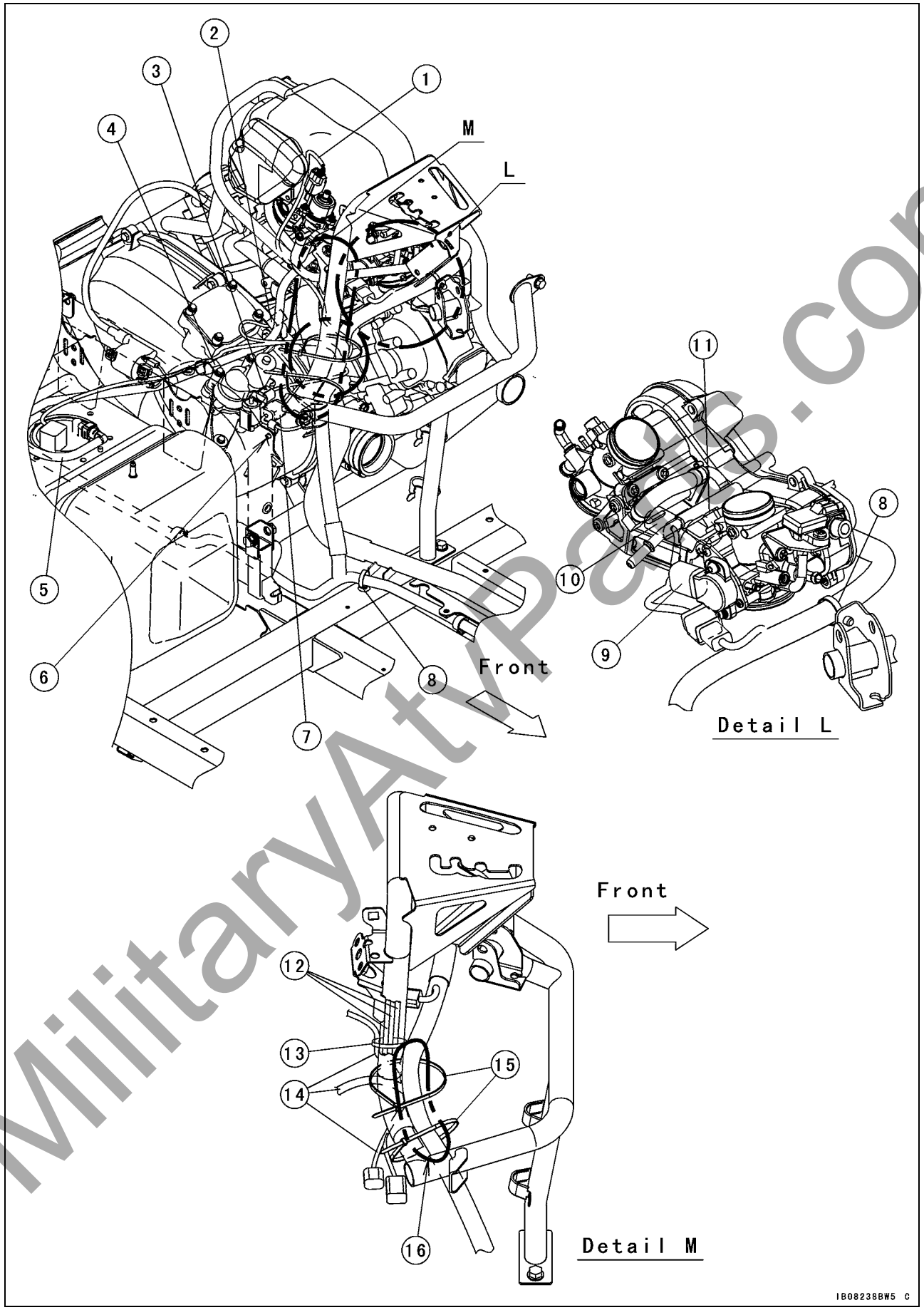
Cable, Wire, and Hose Routing



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Cable, Wire, and Hose Routing

1. ISC Valve Harness
2. Water Temperature Sensor
3. 2WD/4WD Solenoid Valve Connector
4. Clamp the fuel hose and harness with clamp.
5. Fuel Pump/Fuel Level Sensor
6. Clamp the engine brake actuator harness with the clamp.
7. Engine Bake Actuator
8. Clamp the main harness with clamp.
9. Throttle Position Sensor
10. Fuel Injector #2 (Rear)
11. Fuel Injector #1 (Front)
12. Breather Hoses
13. Clamp the harnesses and breather hoses with the clamp.
14. Run the branched harnesses under the pipe.
15. Bands (Secure the main harness to the pipe.)
16. Secure the main harness at the front of pipe within this area with the bands.

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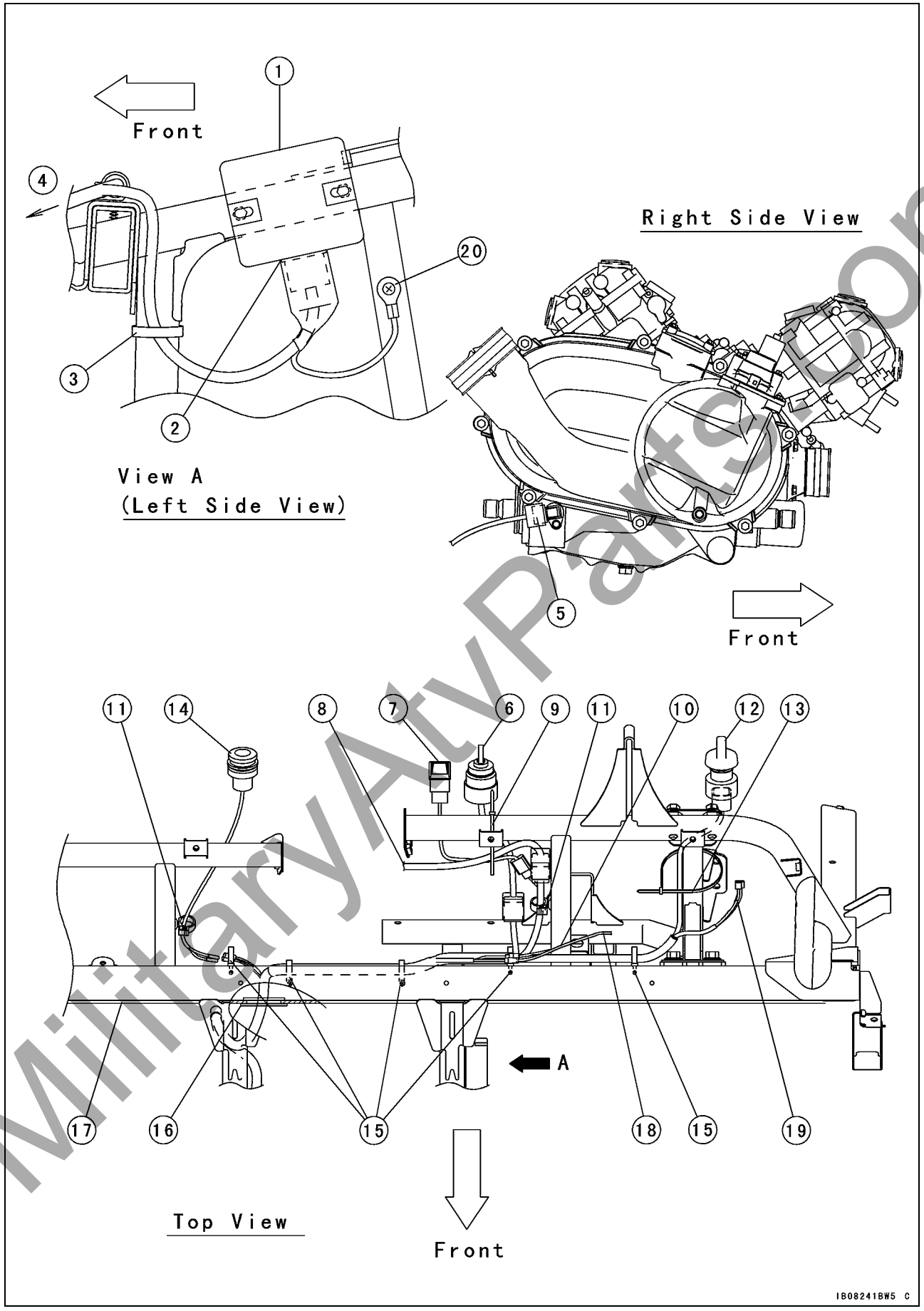
Cable, Wire, and Hose Routing



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Cable, Wire, and Hose Routing

1. Regulator/Rectifier
2. Cover the regulator/rectifier connector with cover.
3. Band (Secure the regulator/rectifier lead with the front gear case breather tube and the fan motor breather tube.)
4. to the Left Headlight
5. Speed Sensor
6. Ignition Switch
7. 2WD/4WD Shift Switch
8. Multifunction Meter Harness
9. Bands (Secure the ignition switch, 2WD/4WD shift switch and mutifunction meter harnesses.)
10. Run the brake line and the harnesses above the frame.
11. Clamps
12. Lighting Switch
13. Bands (Secure the lighting switch harness to the brake bracket.)
14. Accessory Connector
15. Clamps
16. Grommet (Large Diameter)
17. Floorboard
18. Brake Light Switch Lead
19. Parking Brake Light Switch Lead
20. Frame Ground 2

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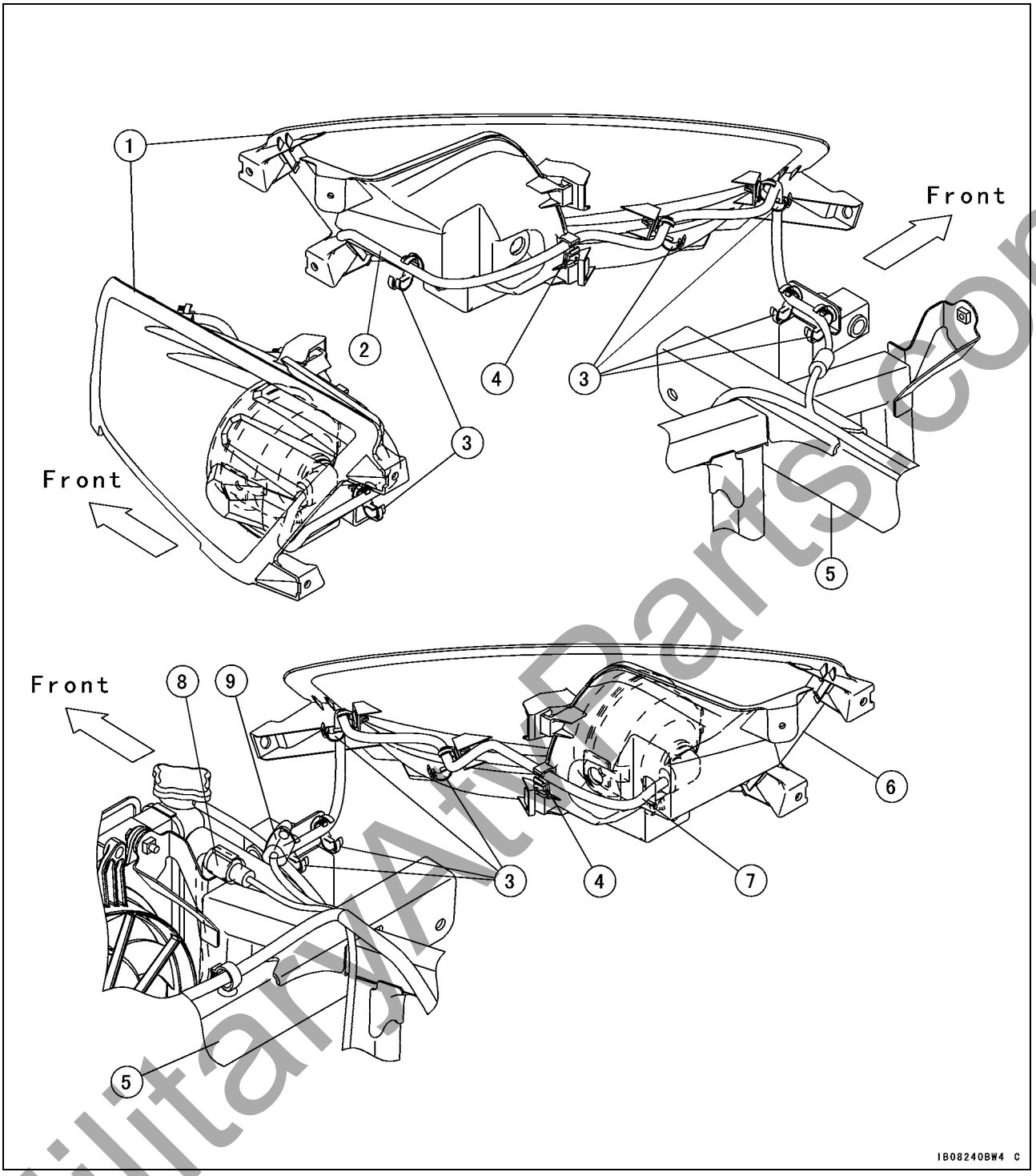
Cable, Wire, and Hose Routing



1. Left Headlight Cover
2. Left Headlight Lead
3. Clamps
4. Holder (Hold headlight lead to the headlight cover.)
5. Frame
6. Right Headlight Cover
7. Right Headlight Lead
8. Run the radiator fan motor harness between the bracket and the radiator hose.
9. Run the right headlight harness above the radiator reserve tank hose.

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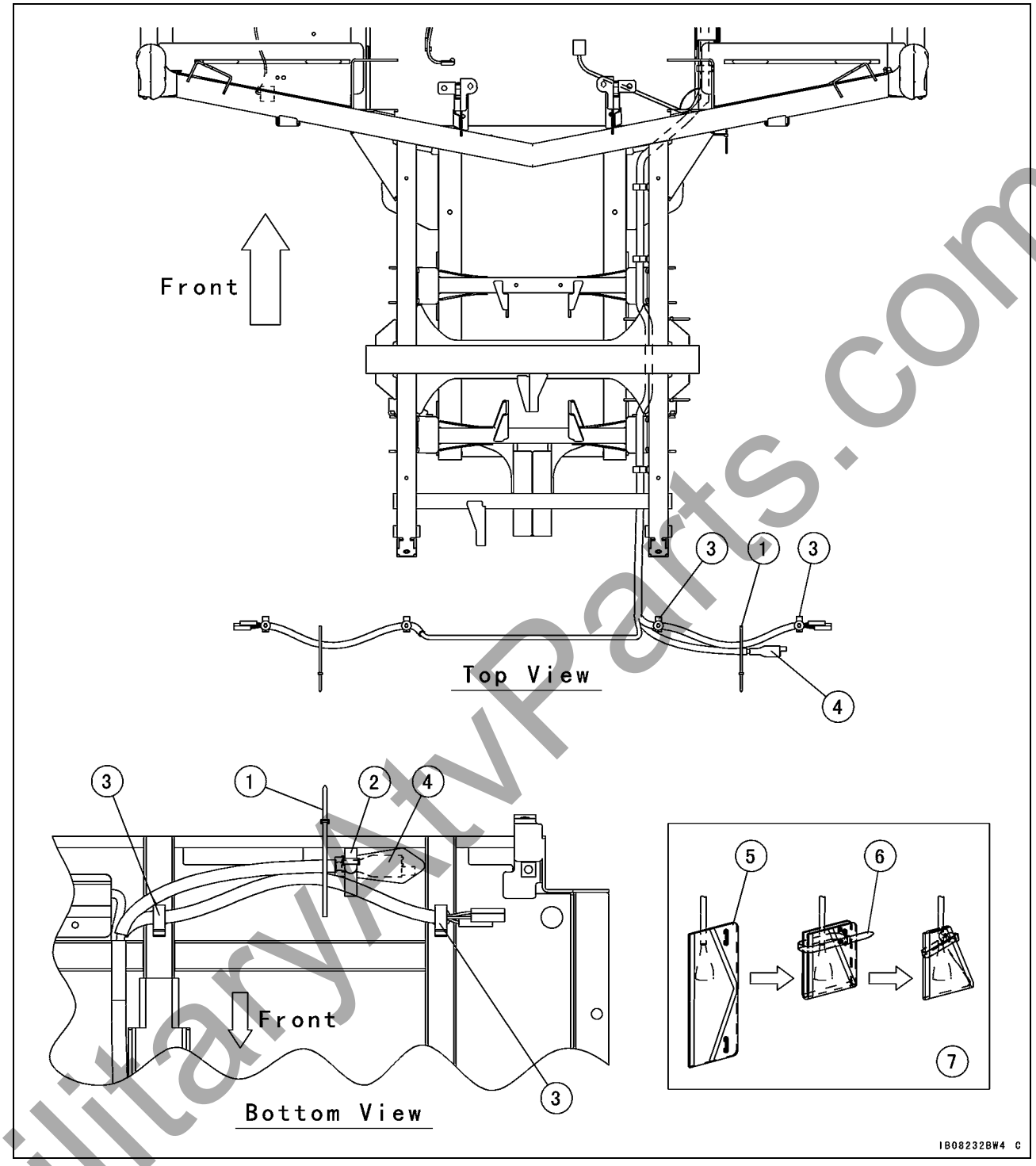
Cable, Wire, and Hose Routing



1. Band (Right and Left sides)
2. Clamp the tail light lead (each sides) and reverse light lead (right side only) to the bar.
3. Clamp (Clamp the tail light lead.)
4. Reverse Light Lead Connector
5. Cover
6. Band
7. Installation of Cover

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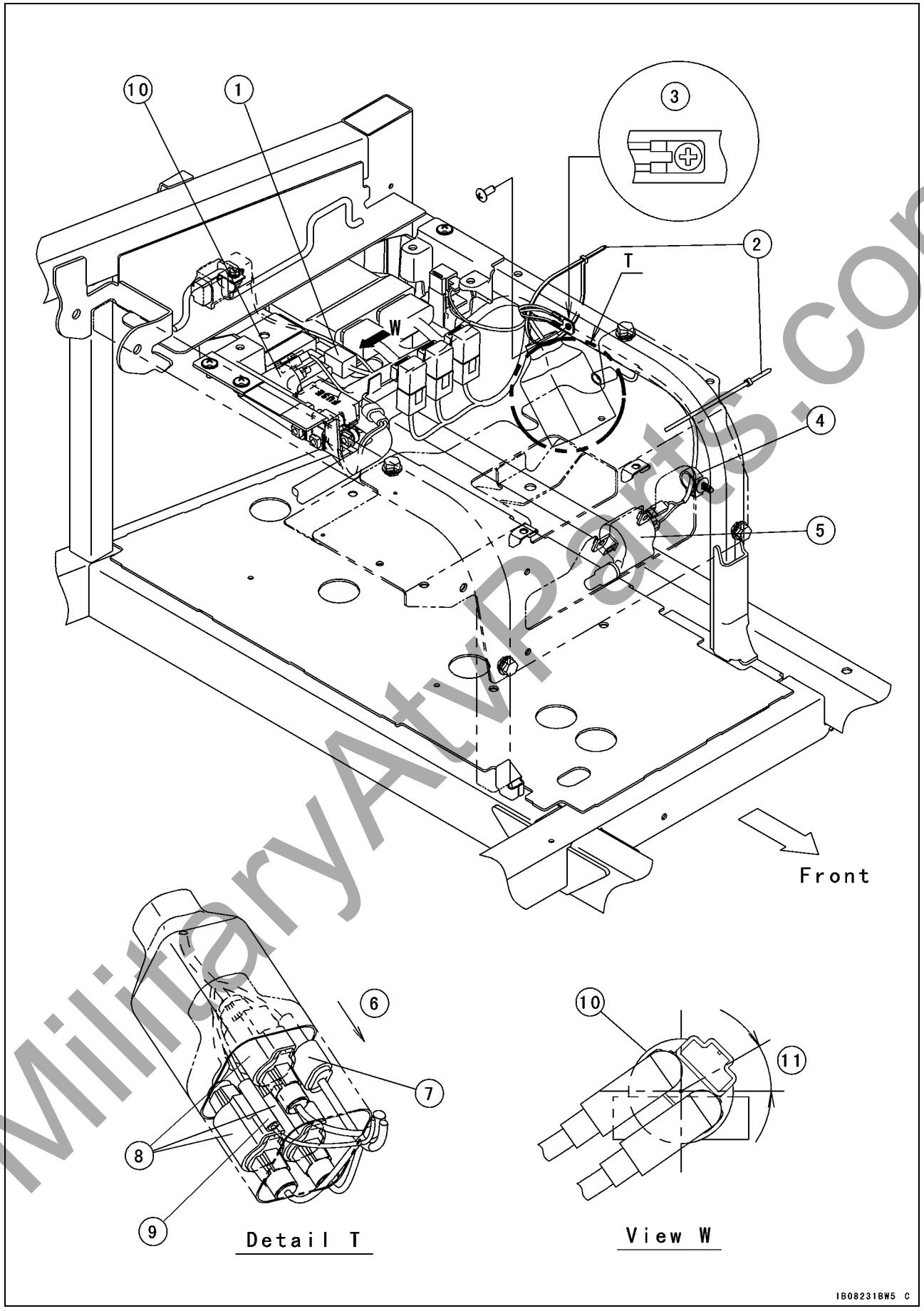
Cable, Wire, and Hose Routing



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Cable, Wire, and Hose Routing

1. Kawasaki Diagnostic System Connector
2. Clamp the frame and main harness with band.
3. Place the frame ground 1 terminal horizontally as shown.
4. Clamp the ignition coil lead with clamp.
5. Ignition Coil #1 (Front)
6. Cover the terminals with cover after connecting the connectors.
7. Crankshaft Sensor Connector (Grease to the inside of the connector.)
8. Alternator Lead Connectors (Free Location)
9. Oil Pressure Switch Lead Connector
10. Starter Relay
11. 30 ~ 45°

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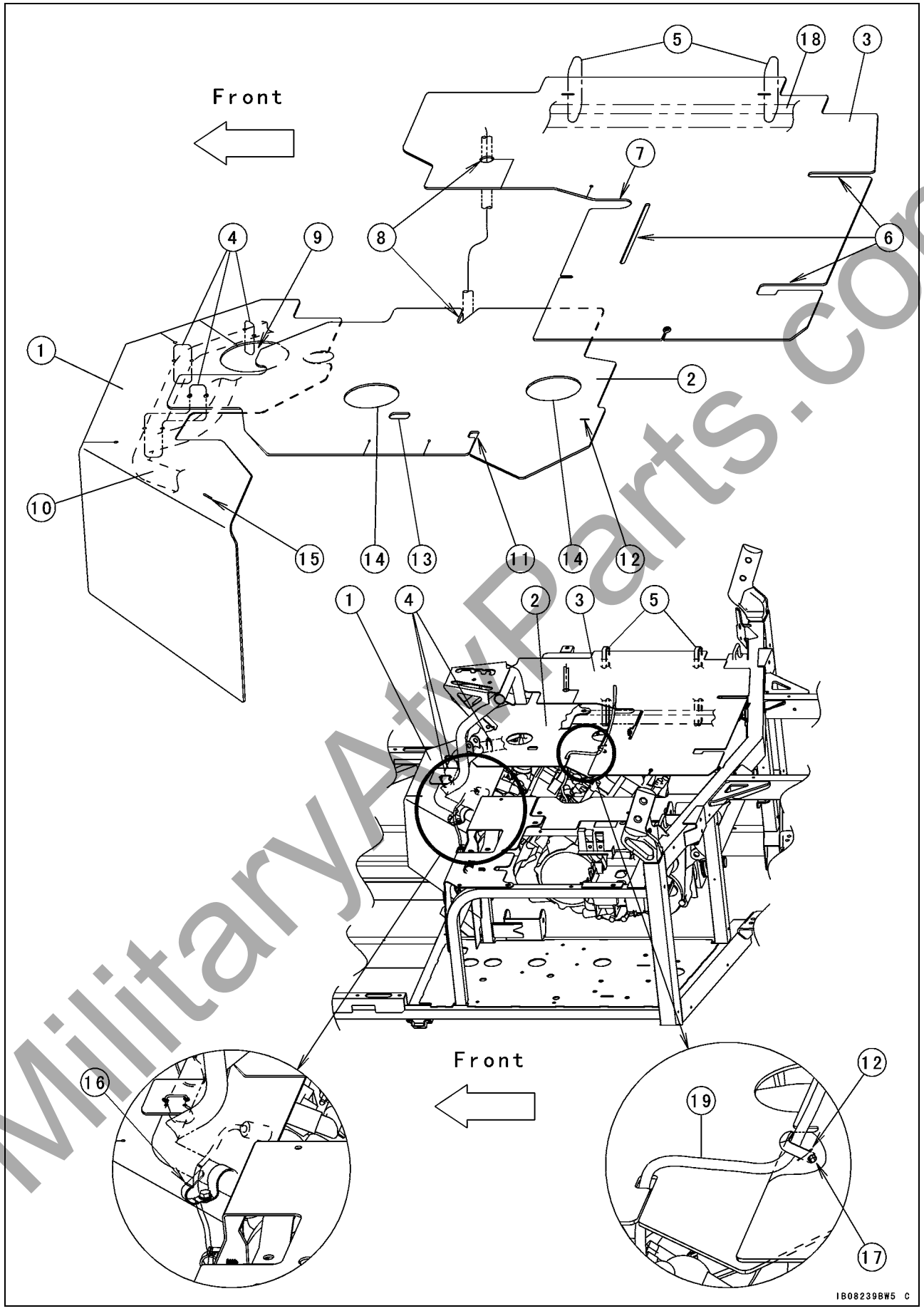
Cable, Wire, and Hose Routing



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Cable, Wire, and Hose Routing

1. Rubber Cover
2. Rubber Cover
3. Rubber Cover
4. Bands
5. Bands
6. for Bracket
7. for Breather Hose
8. for Fuel Hose
9. for CVT Duct
10. Frame Pipe
11. for Harness
12. for Harness Clamp
13. for Drain Tube
14. for Engine Inlets
15. for Clamp
16. Pass the clamp through the cover.
17. Clamp
18. Seat Rail
19. Harness

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MODEL APPLICATION

Year	Model	Beginning Frame No.
2010	KRF750NAF	JKARFDN1□AB500001
2010	KRF750PAF	JKARFDP1□AB500001
2010	KRF750RAF	JKARFDR1□AB500001
2010	KRF750SAF	JKARFDS1□AB500001
2010	KRF750SAFA	JKARFDS1□AB500001
2010	KRF750TAF	JKARFDT1□AB500001

□:This digit in the frame number changes from one machine to another.

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Kawasaki
KAWASAKI HEAVY INDUSTRIES, LTD.
Consumer Products & Machinery Company

Part No.99924-1434-02

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